AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Devoted to the Practical Application of Dyestuffs and the Mechanical Equipment Incidental Thereto

VOL. X NEW YORK, MARCH 27, 1922 Number 7

The Piece Dyeing of Ladies' Dress Goods and Coatings with Acid Colors

Part I

Department Store Apologists for American Dyes Are No Longer on Safe Ground—Suitable Colors—Theory of Acids and Glauber's Salt—Treatment of Goods Before Dyeing

By B. T. C.

In General

THE dyeing of ladies' dress goods and coatings, especially into the numerous mode shades so popular with the women of to-day, calls for a great deal of knowledge and skill on the part of the dyer. Not only must he consider the dyestuffs and chemicals used in the operation, but the quality of the yarn, and weave construction as well. The dyeing of Bolivia cloth, for example, is an entirely different proposition from the dyeing of a piece of Poiret twill, and any dyer who attempts to treat such widely differing fabrics according to one and the same procedure sooner or later gets into trouble.

Acid colors are almost wholly used for the piece dyeing of worsted dress goods, due probably to the ease with which they may be applied to the wool fiber and to the comparative simplicity with which color additions may be made to bring the batch up to standard. Wool fiber seems to have a natural affinity for acid colors, acting as a base and forming more or less insoluble color lakes with them. However, these lakes vary in fastness, depending upon the dyestuff used. Orange GG, for instance, is very fast to light, is not sensitive to acids or alkalies, but is only fairly fast to washing. On the other hand, the sulphone cyanins possess excellent fastness to light, washing, milling, acids, alkalies and stoving.

In these modern times we hear a great deal about the term fastness, due perhaps to the recent agitation of the American press. In the past it has been more or less the policy of many retailers to say to a customer when selling a piece of goods or a suit, "Sorry, but we cannot guarantee these colors as they are dyed with a domestic product." While that excuse was no doubt reasonable enough during the war, such certainly is not the case to-day. Gradually the list of available dyestuffs has been augmented until at present the market contains any number of colors of the required fastness. If they are not being used it is due either to the neglect of the dyer or to a mill policy of securing the desired shades with the cheaper but more fugitive dyestuffs. Naturally enough the tests for fastness for ladies' dress goods are less severe than for men's wear, but nevertheless the shades dyed must give the customer satisfaction.

Colors Suitable for Dress Goods

We will quote a list of colors which are available on the American market to-day and which are suitable for such work as the dyeing of ladies' dress goods:

For Navies:
- Wool Blue CB and CG.
- Wool Green (various marks).
- Azo Fuchsine 6BN.
- Fast Light Yellow 3G.
- Wool Orange GG Crystals.

The above list of colors will produce any shade of navy that may be desired. All the dyes are extremely level dyeing. If greater fastness is necessary navy shades may be had with the following colors, although care must be taken in the dyeing operation:

- Buffalo Fast Blue R.
- Fast Wool Violet B.
- Fast Wool Cyanone R and 3R.

For Greens:
- Acid Green L.
- Fast Acid Green B.
- Patent Blue A or V.
- Tartrazine.
- Fast Crimson GR or R.

For Browns:
- Tartrazine.
- Fast Crimson GR or R.
- Patent Blue A or V.
- Wool Orange A.
- Alizarine Sapphire SE.

For Reds, Crimsons, Clarets, Etc.:
Fast Crimson GR or R.
Azo Fuchsine 6B.
Acid Red 4B
Patent Blue A or V.
Tartrazine.
Wool Orange GG, crystals.

For Violets:
Wool Violet 4BN.
Azo Wool Violet 4B.
Patent Blue A or V.
Fast Crimson GR or R.
Fast Yellow 3G.
Alizarine Sapphire SE.

For Blacks:
Buffalo Black NBR.
Amido Naphthol Black 3BL.
Buffalo Black 2SB.
Buffalo Black 4AB (acetic acid).
Tartrazine.
Wool Orange A.

For Mode Shades:
Nearly any mode shade under the sun may be produced if the following dyestuffs are used:
Patent Blue V or A.
Alizarine Sapphire SE.
Alizarine Sapphirole B.
Fast Crimson GR.
Azo Fuchsine 6BN.
Fast Light Yellow 3G.
Wool Orange GG, crystal.

The colors named have stood the test of usage and with proper control give satisfaction to all concerned. These colors are level dyeing, penetrate well and possess the necessary fastness requirements for such goods as the type with which we are now dealing.

THE THEORY OF THE USE OF ACIDS AND GLAUBER'S SALT

In order that the dyer may fix the so-called acid colors on wool, an acid bath is required. This fact, as a rule, has been explained by the supposition that acid is necessary in order to set free the color acid and enable it to combine with the wool. Further investigation has shown that part of the wool itself undergoes a chemical change due to the presence of acid, probably forming lanuginic acid. Knecht, for instance, has demonstrated the effect of acid upon the wool fiber by the following experiment: Wool is boiled with 10 per cent of its own weight of sulphuric acid and then boiled out a number of times with water until the last wash water shows absolutely no traces of acid when methyl orange is used as an indicator. If the wool so treated is then placed in a beaker containing 2 per cent of any acid color, such as Crystal Scarlet, without the addition of any acid whatever and boiled the fiber is dyed a full shade. One investigator advances the belief that lanuginic acid contains both acidic and basic groups in its molecule and that it is the basic group which is selected by the color acid, forming the color lake. Then as the temperature is raised gradually to the boiling point, this chemist believes that more and more lanuginic acid forms and that the color acid unites with it until the bath is exhausted.

The acids commonly used in the dyeing of wool are sulphuric acid, acetic acid and, to a slight extent, formic acid. Niter cake or sodium acid sulphate also find extensive use in such work. The value of any acid for the fixation of colors from a dye bath depends wholly upon the hydrogen ion content, and as all textiles are affected more or less by acids, this content is of extreme importance. In the case of sulphuric acid (H_2SO_4) the ion content is quite high. In using this acid dyers soon found that the wool fiber was weakened and that many colors were deposited unevenly in the wool due to the great strength of the acid. When using H_2SO_4 with suitable colors, 2 to 4 per cent, depending on the shade, is generally sufficient to exhaust the bath.

Sodium acid sulphate acts in a very similar manner to sulphuric acid, although its action is much slower. It is because of the latter reason that dyers use niter cake, as it is often called, to exhaust the dye bath, especially for goods which are difficult to penetrate. The chemistry of the use of sodium acid sulphate is quite interesting. As the temperature of the bath is raised gradually to the boil the niter cake breaks up into Glauber's salt and sulphuric acid, according to the following reaction:

$$2NaHSO_4 = Na_2SO_4 + H_2SO_4$$

As the sulphuric acid is formed it aids in the exhaustion of the bath. This means of exhausting the bath is very popular with some dyers who use from 5 to 10 per cent $NaHSO_4$. It is no doubt true that $NaHSO_4$ has many advantages that H_2SO_4 does not possess. In the first place, in the use of vitriol there is always the danger that due to carelessness of the workmen the acid may be spattered on the pieces as they revolve in the kettle, thus causing clouds. With $NaHSO_4$ this can never happen, as it is added to the kettle in lump form. Second, niter cake, being a solid, is easier to handle. Third there is practically no danger from handling $NaHSO_4$, while many have been badly injured in handing the vitriol. And finally, the rate of exhaustion for niter cake is less than for sulphuric acid.

Knowing the harmful effects of vitriol upon the wool fiber, dyers attempted to use acetic acid (CH_3COOH) in its place. Good results were secured with acetic acid colors, but in many cases it was found that the exhaustion of the bath was a hard thing to accomplish with acetic alone. In other words, the hydrogen ion content was too low for the acid to be fully effective. Therefore, in order to complete the exhaustion the dyer had to resort to a further addition of vitriol, the use of which was just what he originally hoped to avoid. Usually from 5 to 10 per cent acetic acid is used. One method that has brought good results to many is to start the bath with

3 per cent acetic acid and adding gradually 3 to 6 per cent $NaHSO_4$ as the bath is being raised to a boil.

Of late years a great deal has been written in regard to the use of formic acid in dyeing. There is no doubt but that this is the acid of the future and that the price alone has hindered its general adoption by the trade. Formic acid (HCOOH) has one distinct advantage over H_2SO_4 in that its hydrogen ion content is less than that of the mineral acid, and yet it is fifteen times stronger than acetic acid. In other words, 1.086 per cent of HCOOH is just as effective as 16.36 per cent CH_3COOH. Lately it has been claimed by the manufacturers that dyeing with formic acid is cheaper than dyeing with acetic acid and subsequently exhausting with oil of vitriol. It has also been claimed that HCOOH produces better penetration, more even dyeing, brighter shades and has a much less tendering action on the fiber.

We now come to the use of Glauber's salt (Na_2SO_4) in the dye bath. When added to the bath this chemical exerts a retarding action on the process, thus bringing about more level dyeings. It also has a stripping action on acid colors after they have been fixed on wool fiber. Many theories have been advanced explaining its action during dyeing. Some claim that the action of the sulphuric acid is retarded by the Glauber's salt and thus the lanuginic acid is not formed so readily with consequent slowing up of the dyeing process. Others use the following equation to bear out their theory:

$$\text{Dyestuff (Color — Salt)} + H_2SO_4 = \text{Color acid} + Na_2SO_4 \text{ or Glauber's salt.}$$

They contend that as Glauber's salt is produced by the action of the acid upon the dyestuff, by adding more Glauber's salt its mass is increased and that this will tend to reverse its action as follows:

$$\text{Color — acid} + Na_2SO_4 = \text{Color — salt} + H_2SO_4.$$

It has been said that too much Glauber's salt can never be used, but for ordinary purposes 20 per cent is sufficient. A good grade of salt should be used, and should be as free as possible from iron.

Treatment of Goods Before Dyeing

Systems in mills vary, but as a rule piece goods come to the dyehouse in one of two ways: either from the washhouse, in which case they are generally wet, or from the carbonizing department. When the pieces come from the washhouse they should be absolutely clean and free from soap. Scouring of piece goods has for its object the removal of all spinning oils added in previous operations as well as the warp sizing and dirt picked up and held mechanically by the fibers. If the emulsification and subsequent removal of these wool oils are incomplete cloudy and streaky dyeings are bound to be the result. It is important that all the warp sizing be removed during wet finishing, or streaky effects are apt to occur when the pieces are dyed. However, very little trouble will be had by the dyer if a good grade of wool oil is used and if the finisher sends his goods to the dyehouse perfectly clean. Goods which come from the washhouse are apt to be the heavier grades of woolens which for various reasons are carbonized before being fulled. This applies especially to velours, bolivias, cheviots and fabrics of a similar nature. Goods which contain cotton threads in the selvedge or whose warp contains cotton also come direct from the washhouse. Occasionally light-weight dress goods which are to be dyed light shades are not carbonized, in which case they also come to the dyer from the wet finisher.

The goods that come from the carbonizing department are generally light-weight fabrics and usually come unneutralized. It might be well at this point to emphasize the need of good work in carbonizing in order to secure good results in the actual dyeing itself. The well-known "resist" has caused no end of trouble throughout the trade. Another point is the fact that uniform saturation with sulphuric acid is absolutely essential, for if the distribution of acid is uneven, uneven results automatically appear in the pieces and are apparent only after the goods have been dyed. This is due to the fact that wool undergoes a certain change in its affinity for dyestuffs during carbonization and naturally places which hold more sulphuric acid will dye different depths of shade than parts holding less. This is a fact that is often overlooked.

When the goods are received in the dyehouse it is a very good plan to examine all pieces that are to be dyed light shades for stains, oil spots and grease marks. If found to be free from such defects they are ready to be dyed, but if not should be turned at once into a navy or black or any shade that will cover the defect. This examination is often omitted, but is the best plan if many light colors are to be dyed.

The dyer may now treat the carbonized pieces in one of two ways. He may allow the sulphuric acid held by the fibers to remain in the cloth and dye with the addition of Glauber's salt and color only. This method is satisfactory if the dyer is absolutely certain of the level dyeing properties of his dyestuffs. The safest plan, however, is to neutralize the goods with ammonia at 110 to 120 deg Fahr. After allowing goods to run for one-half hour wash off with cold water. Some dyers seeking to be especially careful wash the goods a second time with water at 110 deg. Fahr. and, after fifteen minutes, cool down. It is a very good plan to allow the carbonized pieces to run for some time in the cold water before adding the ammonia. This is especially true where pieces are still warm from the baking they received in the carbonizing oven. Naturally a heat reaction occurs when the ammonia reacts with the acid held by the cloth and unless this heat is controlled the wool fiber itself is apt to be injured. There is no necessity for neutralizing goods which are to be dyed black.

Occasionally uncarbonized worsteds which are to be dyed full shades and are to be speck dyed afterwards are placed in the kettle the afternoon before dyeing, although no water is added. This does not apply to light

shades. Usually, however, the pieces are placed in the dye kettles just before the dyeing is to take place. Velours, broadcloths or any fabrics that tend to develop wrinkles during dyeing are, as a rule, tacked before being put into the machine.

(*To be concluded.*)

Dyeing Cotton Cloth in Cold and Slightly Warmed Baths with Direct Coloring Matters

Colors Available for This Process—Methods of Application—Apparatus Employed—Small Batches of Goods—Operation of the Beam Dyeing Machine—Advantages of This Machine for Cold Dyeing—Jigger Dyeing and Its Advantages—Preparation of Solutions

By RAFFAELE SANSONE

THE processes for dyeing cotton cloth goods in cold or slightly warmed baths are no novelty, and some of them have been known for more than twenty years. The necessity of their application beyond certain limits, and for certain special purposes, was not, however, felt as long as the cost of the warming operations represented almost negligible figures, especially when dyeing was conducted on a certain scale, or together with other processes, such as the boiling out of cotton fabrics.

The case is quite different at present, however; for, owing to the high price of coal and to the danger, in the future, of a certain scarcity of this important fuel, the uses of which have increased enormously during and since the war; to the necessity of continually reducing the cost of dyeing to meet competition from every quarter: to the desire to avoid boiling baths, which complicate the turning operations and are the cause of the formation of fog in the dyehouse, and to the wish of many manufacturers to conduct the dyeing of fabrics on a certain scale without undergoing the expense of a boiler for the generation of steam—owing to these many factors the manufacturer of dyed cotton cloth goods finds it more and more difficult to make ends meet, and hence a means for overcoming his difficulties, like cold dyeing, is often very welcome.

A First Application in the Dyehouse

By the foregoing, however, it is not meant that it will be possible for a foreman dyer accustomed to dyeing in the warm to adopt at once, for the treatment of large batches of cotton cloth, a process that is quite new to him. He can, nevertheless, after a certain number of experiments conducted first in the laboratory on a small scale by a good chemist and then by himself on some yards of cotton cloth, try the treatment on a large scale in the works, preferably at first on a small batch of material. From the results thus obtained he can then proceed to the treatment of another small batch, and later to that of a large batch, conducting little by little the treatment of all his goods with the new process or modification thereof to suit his needs.

Colors Available

With the great development before and since the World War in the manufacture of synthetic products of all sorts, the dyer has at his disposal quite a large series of suitable colors, by the use of which he can obtain in cold or slightly heated baths the greater part of the shades he requires.

Among the above colors may be mentioned Erica BN, Erica GN, Brilliant Purpurine, Congo Rubine, Curcumine, Chrysophenine, the Chicago Blues, Columbia Blue R, Heliotrope 2B, certain brands of Columbia and Zambesi Black, etc.

Methods of Application

When using direct colors, these are dissolved in warm water and the resulting solution is poured in the cold dye bath, containing, for every 100 parts of liquor, in the case of light shades from 0.2 to 0.5 part of sulphate of soda crystals and 0.5 part of green olive oil or white Marseilles soap. For colors of dark shade an addition of 0.5 to 1.5 parts of sulphate of soda crystals, 0.15 part of sulphonated olive oil or castor oil (Turkey Red oil), and a little carbonate of soda is made.

The properly boiled-out cotton goods are entered in this instance in the cold dye bath containing as little water as possible, moving in it from three-quarters to one and one-half hours, in accordance with the intensity of the shade desired. On taking out the cotton cloth goods from the bath they are slightly rinsed and then dried as usual. The baths in some cases are left in the same state of exhaustion as on a large scale.

The Machines Employed

The machines employed for dyeing cotton cloth goods in the cold have so far been generally those em-

ployed for dyeing in the warm. One of the most satisfactory arrangements for the purpose is undoubtedly the continuous dyeing machine, where the material is caused to pass several times through the dyebath contained in a shallow wooden vat while being run up and down on a double series of guiding rollers, the operation being greatly assisted if the upper guiding rollers are supplied with pressing cylinders. In this event the material comes into better contact with the dye solution than when dyed on the jigger, since the latter is obliged to enter and make its exit far more frequently. The dye bath must, however, be maintained always at the same strength by causing a fresh and somewhat stronger bath to enter in the contrary direction to that followed by the cloth running through, and to make its exit where the cloth enters, following which it can be used over again repeatedly after strengthening in each instance. Larger quantities of dye bath are required in this instance than when dyeing on the jigger, and this constitutes a marked disadvantage when very large batches of material are not to be dyed in one color.

Dyeing Small Batches

For dyeing small batches of cotton cloth the beam dyeing machine can give very good results, owing to the fact that with this apparatus the dye bath is compelled to circulate continuously through the material, impregnating all portions over and over again with a comparatively small quantity of dye bath which can thus be exhausted if the nature of the color or mixture of colors used for its preparation allows it.

The construction of this machine is not very complicated. It consists principally of a long, narrow wooden or copper case, closed at one end and open at the other, before which can be fixed a tight-fitting copper door. The interior of the case is arranged for sustaining a strong copper beam, around which is wound one or two of the pieces of the cotton cloth to be treated. The core (or middle portion) of the beam is perforated and can be fixed at the closed end of the cylindrical case to a conical projecting tube terminating, on the outside of the said cylinder, in the body of a centrifugal pump which forces all liquid at the bottom of the cylinder upward. The central core is fixed at the other extremity to a projecting cone on the copper door already mentioned.

Operation of the Beam Dyeing Machine

The working of the plant is very simple. The whole of the dye bath necessary for the production of the required shade is entered, through the centrifugal pump and a special tube on its upper portion, in the dyeing cylinder in a quantity sufficient to fill the latter completely. The tube is then closed by means of a special tap and the operation of the pump continued so as to force the dye liquor repeatedly through the material under treatment. Operation is continued as long as any coloring matter can be extracted from the dye bath. This may be determined by taking, from time to time, a sample of the dye bath through a small tap fixed on the body of one of the circulation tubes, pouring it into a large test tube, and observing it side by side with a sample taken a certain time before When in this way it is observed that the solution loses no further color, the dyeing process should still be continued for some time. Upon completion the bath may be pumped into a separate vat and there stored for future dyeing operations, or, in the case of colors that exhaust completely, into the waste water main.

Advantages of the Beam Dyeing Machine for Cold Dyeing

The advantages of the above apparatus cannot be overrated, and some of them can be considered as follows:

1. The material can be dyed in the wound form very uniformly with most colors dyeing in the cold.

2. The action of the dye bath can be prolonged at will for any amount of time, and even overnight if necessary, there being only a question of a small expense for motive power.

3. The employment of labor is very small, one workman being sufficient for preparing the dye baths for a whole series of apparatus dyeing different colors, while another may give his attention to the entering and taking out of the beams of material, to the winding on the beam of the pieces of cotton cloth, etc.

4. As the dye bath required is in small volume, it may be used in a fairly concentrated form, which assists the production of strong shades with some of the colors.

5. When the heating facilities permit and the dye baths can be obtained warm, the material can be treated during the cooling-down process.

6. For the better conservation of heat in the dyeing cylinders, these may be constructed with double walk enclosing a vacuum.

7. The heating of each single apparatus may be conducted to advantage through the use of an electric heater applied to the lower portion of the cylinder of treatment, or in the inside of one of the circulation tubes. This would allow the carrying out of the boiling-out and dyeing operations on some fabrics—and thereby give double value to the plant—when large-scale production is not required.

8. The space occupied by the dyeing plant is comparatively small, for many dyeing cylinders may be fixed in a frame so as to form several lines one above the other, the circulation pump being placed in each instance at their back.

9. Through the application of electric heating, the deepest shades may be produced and any direct color employed.

10. All classes of cotton fabrics may be dyed, from the frailest to the heaviest, etc.

Jigger Dyeing

The jigger, under certain circumstances, also offers great advantages for the cold-dyeing of direct colors. The colors used in this instance should, however, be carefully chosen, for it must not be forgotten that the dye bath carried up by the cloth continues its coloring action while on the shafts between which it is unwound and wound. In this instance two pairs of pressing rollers to squeeze the different portions of the material just as these leave the dye bath, and before they are wound on the shafts, would be of great advantage, for in this way only a small quantity of dye bath would remain in the material and the principal dyeing operations would take place in the trough of the jigger itself.

Advantages of the Jigger

The advantages of the jigger for dyeing cotton cloth in the cold with certain direct coloring matters are several, and can be indicated as follows:

1. The operator can observe the fabric he is treating all through the dyeing operations.
2. The jiggers employed for warm dyeing operations can be employed just as they are, or with little modification, for dyeing the same material in the cold.
3. The saving in steam is considerable, if this is used in the works for other purposes.
4. Jigger dyeing in the cold can be adopted when no steam is available.
5. The production can be large or small, as may be required.
6. The knowledge gained by the foreman dyer in the preparation and use of the baths for warm dyeing is not lost, and a portion of it can be utilized in the cold dyeing operation.
7. The advantages of cold dyeing can easily be calculated in comparison with those of warm dyeing, as often no extra expense of plant is necessary.
8. The volume of the dye bath can be reduced, and the bath used as concentrated as possible or convenient.
9. The employment of labor can be somewhat reduced owing to the fact that the dyeing operations depend more on the movement of the material than is the case with warm dyeing, and the exhaustion of the baths can be made to take place simply through the passage of the material, unevenness being less likely than in the first case.
10. Dyeing with a continuous cold bath can be conducted with even greater facility than when employing hot liquors, etc.

Solutions

The preparation of the dyestuff solutions requires simply the installation of a small iron or copper kettle, or boiler, heated by a wood, coal or gas furnace. Electric warming plants would also be useful in this case, such as are already employed in some works for increasing the amount of steam generated through boilers heated by coal.

Fastness to Light

Chaos Exists in This Brand of Dyestuff Science—Reasons for Difficulty of Establishing Standard Conditions for Tests—Variability of Natural and Artificial Lights — Chemical Effects of Ultra-Violet Rays Which Decrease the Value of Tests—Suggested Apparatus for Quantative Exposure

By E. WALLACE PIERCE

THERE is no subject connected with the dyestuff industry which is in such an uncertain state as that of fastness to light. Every other property of any given dye may be classified, compared and measured with a fair degree of technical accuracy excepting light fastness; and this is absolutely chaotic, despite the efforts that have been made to obtain a mode of procedure that will give universally concordant results.

The reasons are: first, the irregularity in the light and conditions under which the tests are made; and second, the lack of equality in the light resistance due to different shades and strengths of the dyestuffs that are tested.

Factors Which Affect Light Values

Anyone who has practised amateur photography knows, from his exposure meter, what widely different values of sunlight must be taken into account as he goes from one latitude to another, from one season to another and how the presence of haze, clouds, etc., affect the sun's value from hour to hour. Of course, everyone realizes this and makes tests comparatively by exposing

(*Continued on page* 240.)

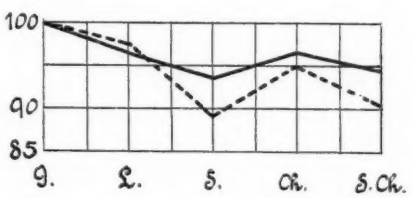
The Effect of Scouring and Bleaching Upon the Structure and Strength of Cotton Fabrics

Delivered Before the Manchester Section of the Society of Dyers and Colourists, and Printed in the Journal of the Society

By J. HUEBNER, M.Sc.Tech., F.I.C.

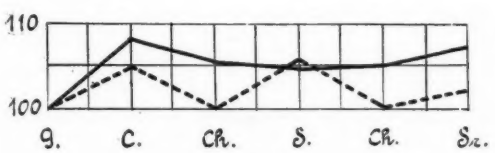
(Concluded from page 200.)

THE number of warp threads per inch in VI, VII and VIII increases in the lime boil, but remains stationary throughout the following processes, while that of the weft threads remains practically stationary throughout



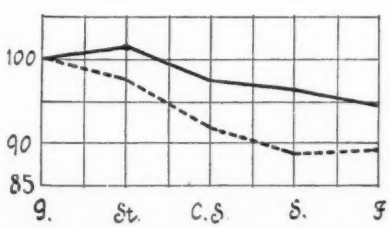
VI., VII., VIII.

The caustic soda boil shows greater irregularities than the other boils, and the end result differs in that the number of weft threads per inch is actually 2 per cent higher than that in the gray fabric. This is no doubt due to greater shrinkage in the warp.

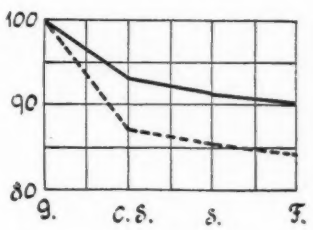


X.

Boiling with caustic soda and soda ash is mainly responsible for the reduction in the tensile strain of fabrics I to V, both warp and weft way. The "steep" —i. e., a gentle boil with soda ash—actually slightly increases the strength of warp and weft in I and II, and that of the warp in IV.



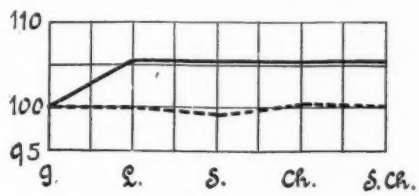
I., II., III., IV.



V.

The effect of the lime boil on the tensile strain of VI, VII and VIII is very slight, while that of the soda boil which follows is much more marked, particularly in the weft.

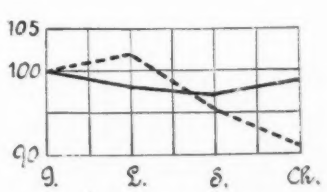
Chemicking increases the tensile strain appreciably and the strength after the final soda boil, chemic and sour is slightly higher than after the first soda boil.



VI., VII., VIII.

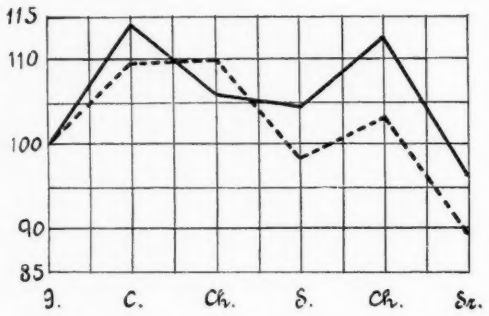
A comparison of the mean textile strain graphs of VI, VII and VIII with the mean of I, II, III and IV shows that boiling with lime and with soda ash is entirely responsible for the reduction in the tensile strain of these fabrics, and that practically no loss in strength results from the two bleaching operations and the souring.

The effect of the shorter process of bleaching (IX), in which the fabric is boiled in lime and only once in soda ash and once chemicked, on the tensile strain of the weft, is similar to that of VI, VII and VIII, but the strength of the warp is even less affected.



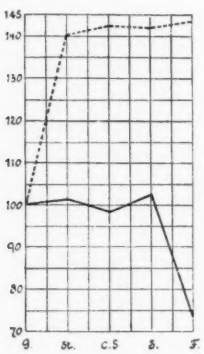
IX.

The effect of the caustic soda boil (X) is very marked. It increases the tensile strain in both directions (9.5—13.8 per cent). The first chemicking hardly affects the weft, but it reduces the strength of the warp, and a further reduction is noticed, less in the warp than in the weft, after the soda boil. The second chemicking increases the strength of both warp and weft appreciably, but the actual loss in strength takes place in the last operation of souring and drying. The final result, however, is as satisfactory as that obtained by the other methods of bleaching.

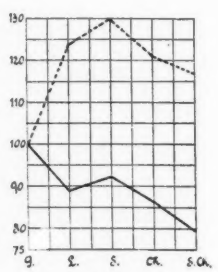


X.

The increase in the elongation of the weft of a fabric at the point of breaking, when a tensile strain is applied, is very marked in all the different processes which have been investigated. It is greatest after the steep in I to IV, after the combined caustic and soda ash boil in V, after the lime boil in VI, VII, VIII and IX, and after the caustic soda boil in X. It then increases slightly but fairly regularly in I to V, during the following operations. In VI, VII and VIII it reaches its highest point after the first soda boil, and it decreases in the final operations.

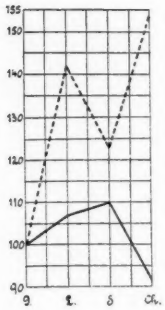


I., II., III., IV.



VI., VII., VIII.

The short bleach (IX) behaves differently from the former, in that the soda boil produces a reduction in the elongation, while the chemicking is responsible for a marked increase.

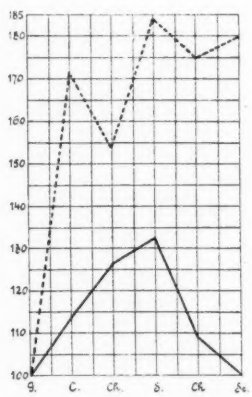


IX.

The caustic boil (X) behaves similar to VI, VII and VIII. The elongation decreases after the chemic and it increases after the soda ash boil. The second chemicking, however, produces a slight reduction which is largely counteracted by the final souring.

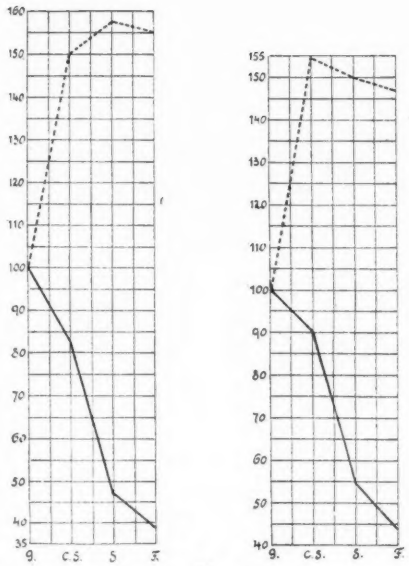
With the exception of the caustic soda boil (X), the elongation of the warp decreases in every case. It is most marked in V, where the loss amounts to 61.3 per cent.

In X an increase in the elongation actually takes place in the warp during the caustic boil, the first chemicking and the soda boil, after which the elongation decreases to that of the original gray fabric. It is obvious that one must expect irregularities in the elongation figures, because they are chiefly dependent upon two factors—i. e., the shrinkage produced by the action of the chemical agents employed and the varying amount of tension placed on the fabrics, particularly in the warp way, in the different machines.



X.

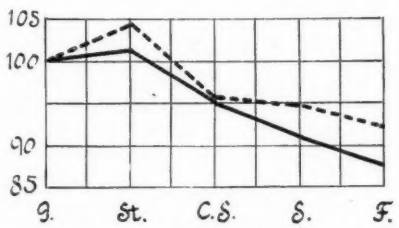
With the exception of No. V, it has not been possible to ascertain the regain after each operation. A comparison of this with the tensile strain elongation of the same fabric shows a remarkable similarity of the two characteristics, in that the elongations at the point of breaking are practically identical with the corresponding regains.



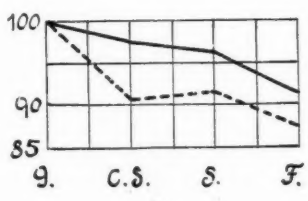
V.

It has, therefore, been shown that careful scouring with lime, soda ash or caustic soda and bleaching, does not unduly reduce the tensile strain of fabrics.

The effect of these processes upon the ripping strain of the bleached fabric is, however, distinctly different. In I to IV, the ripping strain in both warp and weft is slightly increased by the steep. The combined caustic soda and ash boil is chiefly responsible for the decrease in strength, which is greater in the weft than in the warp. In the second soda ash boil and in the final treatment, the strength of the warp decreases fairly uniformly, while that of the weft is only slightly affected by the ash boil, and is a little further reduced in the final treatment. V behaves very similarly to I to IV.



I., II., III., IV.



V.

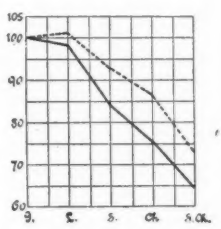
A comparison of the tensile strain of these fabrics with their ripping strain shows a marked similarity as regards the effect of a thorough scouring on their resistance to either tensile or ripping strain.

The mean reduction in the ripping strain, warp and weft way, is only slightly less than that in the tensile strain and the ripping strain of the warp is somewhat less than that of the weft, while the opposite in the case in the tensile strain. The reduction in the tensile and the ripping strain of these fabrics which results from a thorough scouring is, therefore, not a serious one.

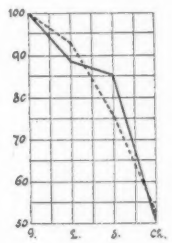
The effect of the lime boil in VI, VII, and VIII on the ripping strain is negligible, but it is somewhat more pronounced in IX. The soda boil, which follows, is responsible for a greater reduction in strength.

The ripping strain then becomes fairly uniformly lower in the chemic and in the second ash boil and chemic.

It should be noted that the reduction in strength resulting from the chemic is more pronounced in IX than in VI, VII and VIII, which have been twice chemicked and twice boiled with soda ash. This is most likely due to the fact that in order to obtain a satisfactory result on a less thoroughly boiled (bottomed) fabric, such as IX, the chemicking will have to be somewhat forced.



VI., VII., VIII.



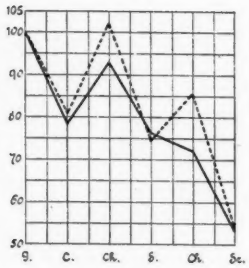
IX.

The ripping strains resulting from the different processes in the caustic soda boil differ distinctly as compared with those of the scouring and bleaching processes dealt with above.

The caustic soda boil weakens the warp nearly 22 per cent and the weft nearly 19 per cent.

The chemicking, however, reduces the loss in the former to about 7 per cent, and it eliminates the loss in the latter entirely. The soda ash boil is responsible for a further striking reduction, both in warp and weft, below that recorded for the caustic soda boil. The second chemicking reduces the strength of the warp slightly, but it increases that of the weft by over 10 per cent. The strength of both warp and weft is finally considerably reduced by the last sour and the drying.

A comparison of the lime boil (VI, VII and VIII) with the caustic soda boil (X) shows that the ripping strain of the latter is distinctly below that of the former. It is practically the same as that of the short boil (IX).

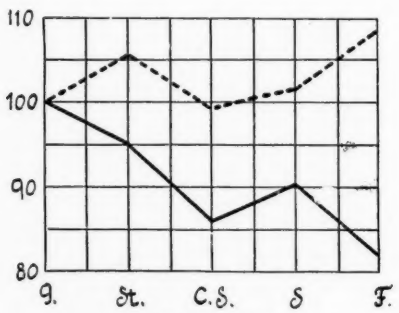


X.

Considerable importance has hitherto been attached to results obtained by removing the warp and weft threads of a fabric and by ascertaining their tensile strain in order to determine the effect of chemical agents and mechanical processes upon the strength of the fabric.

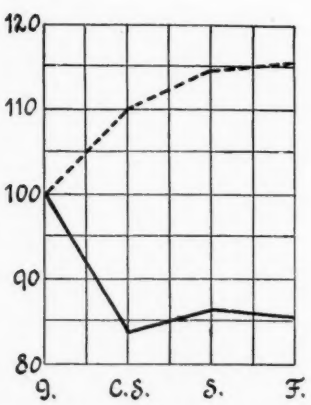
As will be seen from the graphs given below, the results obtained by testing single threads are, however, not directly comparable with either the tensile or the ripping tests.

In the scoured fabrics I to V, and in the bleached fabrics, VI, VII, VIII and IX, the warp threads have been weakened, while the strength of the weft threads has considerably increased.



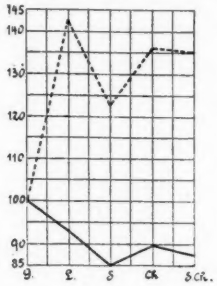
I., II., III., IV.

The decrease in the warp is about the same in all these fabrics, while the increase in the weft is remarkably high in the lime boiled, twice chemicked fabrics (VI, VII and VIII).

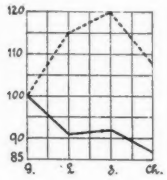


V.

The results of the caustic boil are again distinct from those of the other processes. The increase in the strength of the weft is even higher than in VI, VII and VIII, and the bleached warp is actually stronger than the gray.

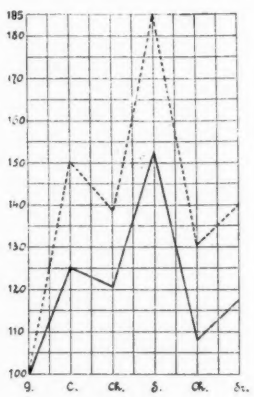


VI., VII., VIII.



IX.

The similarity in the behavior of the warp and the weft, and the increase in strength both after the lime boil and the soda boil and the corresponding reduction after the second chemicking is remarkable.



X.

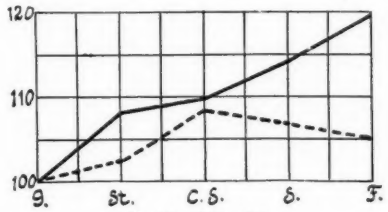
Attention should be drawn to a statement made by Mr. Lowe in a paper which he read before this Society a few months ago, that a yarn becomes more uniform when mercerized without tension. A similar effect has been frequently observed in single thread testing, namely, that steeping and boiling as a rule tends to make a yarn more regular, because many of the weakest places found in the gray yarn disappear, and the lowest mean result obtained in testing the steeped or boiled yarn is, therefore, higher than that of the gray. This may be offered as an explanation of the remarkable differences in the results of the single thread tests as compared with the tensile and the ripping tests.

The elongation of single threads at the point of breaking has also been noted, but it has been found that the figures obtained are not consistent. This is without doubt mainly due to the regain in the threads after removal from a fabric, which makes it exceedingly difficult to get uniform initial tension on the threads between the clips of the testing apparatus.

Definite information with regard to the action of boiling and bleaching agents on fabrics may also be obtained

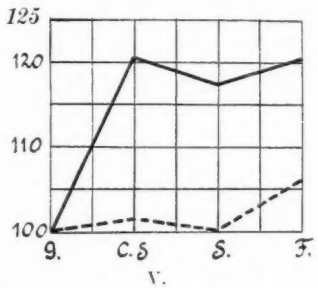
by ascertaining the changes which occur in the counts. i e., the weight of the warp and weft yarns. In the warp this is to a large extent due to the removal of the size.

In scouring I to IV, the warp becomes gradually finer (100 to 120). It will be seen that the steep is responsible for the removal of a considerable amount of impurities and, therefore, a corresponding increase in the count of the warp, while its effect on the weft is naturally much less pronounced. The combined caustic and ash boil, however, is chiefly responsible for the increase in the count of the weft.



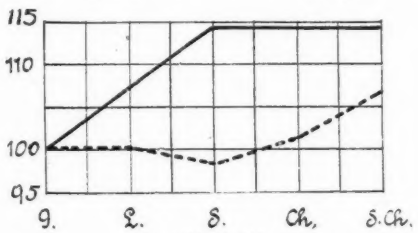
I., II., III., IV.

The effect on the warp of the lime boil, followed by the ash boil (VI, VII and VIII), and of the short bleach (IX), is very similar to that of the scour. The count of the weft in VI, VII and VIII, however, becomes finer in

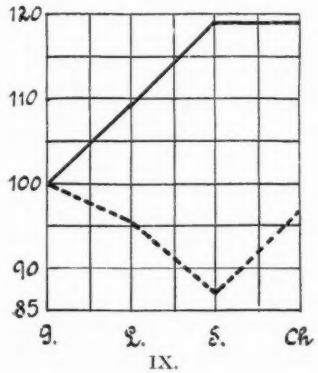


V.

the final ash boil and chemicking, while that in IX becomes actually slightly lower than the gray.

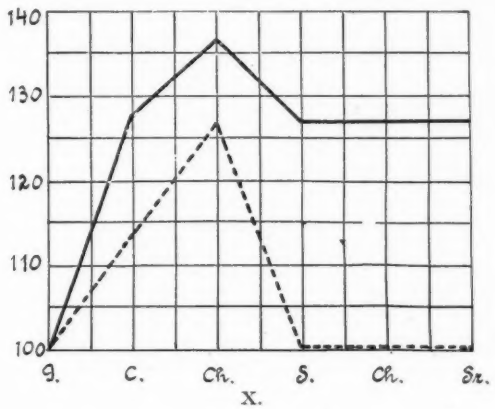


VI., VII., VIII.



IX.

The nature of the change in the counts in the caustic boil is distinctly different when compared with the other methods of boiling. The counts of both warp and weft become much finer in the caustic soda boil than in either the combined caustic and ash boil or in the lime boil and they become still finer in the following chemicking. The next ash boil, however, makes the warp heavier and the weft practically returns to its gray weight. The latter change can only be accounted for by excessive shrinkage. After this no further changes take place in either warp or weft.



X.

In considering the reduction in the tensile and the ripping strain of a fabric, in scouring and bleaching the change in counts should, therefore, be taken into consideration, because this reduction is partly accounted for by the fact that the counts of the warp become considerably higher in every case.

A comparison of all the methods of boiling and bleaching which have been investigated, shows that the tensile strain and the ripping strain are not directly comparable. The results of both tests, however, provide useful information, and while it might be premature to suggest that the ripping test should replace the tensile test entirely, it must be admitted that the tensile test alone does not give a complete record of the nature of the changes which occur in a fabric during scouring and bleaching.

The testing of fabrics for strength, although of considerable interest to the user, is of far greater importance to the spinner, the manufacturer, the bleacher, the dyer, the calico printer and the finisher.

Only by testing fabrics before and after each of the different operations in a very thorough manner can we expect to obtain information which may ultimately lead to improvements in the structure of yarns and fabrics, as well as in the mechanical and chemical processes through which they have to pass.

In submittitng this communication it should be pointed out that, so far, only plain fabrics have been dealt with, and that it will be necessary to extend the investigation to fabrics of a more complex structure. When we further take into consideration the great variety of processes through which the fabrics have to pass in bleaching, dye-

ing, printing and finishing, it will be admitted that the scope of such an investigation is, practically speaking, unlimited.

Throughout the present investigation one has seen that the results obtained in scouring and bleaching are considerably influenced by the structure of the yarn and of the fabric, and that uniformly satisfactory results can only be expected by close co-operation between the spinner, the manufacturer and the bleacher.

The value of industrial research, as suggested above, seems to have been fully realized in America. In recommending it for the serious consideration of the industries concerned, I herewith give an abstract of an article headed "Converters and Finishers Stress Research Body Need," which appeared in Fairchild's Bulletin of November 26, which may not be out of place.

"The Converters' Association and the National Association of Finishers of Cotton Fabrics are working together for a cause which they consider to be the most important confronting the industry to-day. Through the proposed Research Bureau, which has been mentioned in these columns repeatedly, it is insisted that the general production of the cotton mills would be improved, similar cloths standardized, and waste in the way of 'seconds' reduced to an absolute minimum.

"As an instance, it is pointed out that, in a 38½ inch, 64 by 60, print cloth to-day, the weights range from 5.20 yard to 5.50 yard. One mill may use a 28s warp, another 29s, or a 30s warp, and each produces a cloth which it considers standard. The contention is that, in the printing or dyeing of these goods, it is possible that the difference in the weights of the various cloths may affect the impression on the finished product to more than a little extent. The converters and finishers insist that, through study, there would be developed what number yarn was the best to be used; and could thereby introduce a definite standard for all mills to adopt."

The author desires to acknowledge the services rendered by his assistants, Messrs. F. W. Altham and J. E. Hardman, in connection with the large amount of experimental work involved.

College of Technology,
Victoria University,
Manchester

GUESSWORK IN THE DYEHOUSE

The temperature of solutions used in dyeing is a very important matter. Often the difference between a successful batch and one which has gone wrong may be traced to the influence exerted by a few degrees of heat. Few dyers realize the importance of knowing exactly the temperature of the dye bath. For instance, how many dyers think of using a thermometer to determine whether the water in a dye kettle is boiling? Some do, but the vast majority guess at it. Most of us associate a bubbling with boiling—really a very natural thing to do, since most liquids at their boiling point show considerable ebullition.

Recently a test was made to decide if it was possible for one to judge correctly whether water was boiling or not without the use of a thermometer. A Hussong kettle was used, having a capacity of nearly one thousand imperial gallons of water. Five experienced dyers were independently tested; only one dyer was in the dyehouse at any time, and he was not acquainted with the decisions made by the others. Two tests were made, one with the propellers in action and one with them still. Actual temperatures were read from a standard angle thermometer inserted in the kettle. The temperature of the water was about 120 deg. Fahr. when the steam was turned on. The dyer was asked to state when he thought the water in the kettle was boiling, and as soon as he had made a decision the thermometer reading was recorded.

The results obtained were surprising, and of the ten guesses made only one came within three degrees of the truth. As might be expected, the decisions made when the propellers were in motion were furthest from the thermometer readings. The lowest guess was 188 deg. Fahr.—that is, the dyer stated that in his opinion the water in the kettle was boiling when reference to the thermometer showed the temperature of the water was 188 deg. Fahr. The nearest guess was 201 deg. Fahr., which is, of course, 11 deg. out. When the propellers were motionless, the decisions were nearer to the truth: the lowest was 196 deg. and the highest was 209 deg. Fahr.

Another interesting set of experiments was conducted in a raw-wool scouring plant, using several four-bowl machines. Each machine was run continuously for ten hours per day, and the temperature of the water in each bowl was regulated according to the judgment of the operator. No thermometers had ever been used. Since the temperature of the scouring solutions is very important in the first two bowls, attention was given to these. Distant recording thermometers were installed during a week-end in such a manner that the operator was not aware of their presence. Readings were made every hour while the machine was in operation. The correctness of the operator's judgment was studied in the light of these readings.

The variations in the temperature of the scouring solutions were considerable, and frequently dangerous. This is not surprising, since the only guide that the man had was to place his hand in the water for a brief period and rely on his experience to help him out. Naturally, under these conditions, a uniformly scoured product was seldom obtained, and some batches were yellow and harsh, due to scouring the wool at a temperature higher than is desirable. Later, thermometers were installed on the machines and the men taught to regulate the temperature in terms of degrees Fahrenheit.

What can be learned from these experiments? They emphasize what should be a well-known fact—viz., that you cannot guess at temperatures and be correct. Once in a hundred times you may guess so near to the truth that the difference is negligible, but in the other ninety-nine trials you will be wrong, and a mistake may be made which may prove to be very costly. If one can seldom guess when the water is actually boiling in a

(*Concluded on page 236.*)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
LOUIS A. OLNEY
Lowell Textile School, Lowell, Mass.

Vice-Presidents
WILLIAM D. LIVERMORE WILLIAM H. CADY

Secretary
WALTER E. HADLEY
5 Mountain Avenue, Maplewood, N. J.

Treasurer
WINTHROP C. DURFEE
516 Atlantic Avenue, Boston, Mass

Councilors
ELMER C. BERTOLET GEORGE A. MORAN
ARTHUR E. HIRST WILLIAM K. ROBBINS
WALTER M. SCOTT

FIFTH COUNCIL MEETING

The fifth meeting of the Council of the American Association of Textile Chemists and Colorists was held at the Engineer's Club, Boston, Mass., on Friday March 10, 1922.

The following members were in attendance: L. A. Olney, Wm. D. Livermore, Wm. H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee and W. E. Hadley.

Wm. K. Robbins was unable to attend, but was represented by Miles R. Moffatt of the Amoskeag Manufacturing Company.

The following members were admitted into the Association by vote of the Council:

Active Membership

Anders, H. R., P. O. Box No. 3, North Dighton, Mass.
Chemist, Mt. Hope Finishing Company.

Betz, L. D., Swanson and McKean Streets, Philadelphia, Pa.
Manager, E. F. Drew & Co.

Dabbs, John L., Box 1251, Charlotte, N. C.
Sales Manager, Du Pont Company.

Ferguson, P. A., 26 Rosewood Street, Pawtucket, R. I.
Colorist, Acme Finishing Company.

Flynn, Oscar R., 673 Springdale Avenue, East Orange, N. J.
Chemist, Waldrich Bleachery.

Herrmann, Henry F., 21 Burling Slip, New York City.
Chemist, National Aniline & Chemical Company.

Jones, A. S., 1400 East Tenth Street, Eddystone, Pa.
Assistant Colorist, Eddystone Print Works.

Millea, M. J., 706 North Fifty-eighth Avenue West, West Duluth, Minn.
Dyer, Klearflax Linen Rug Company.

Musgrave, A. F., 365 St. John's Place, Brooklyn, N. Y.
Textile Chemist, American Aniline Products.

Pratt, L. A., Merrimac Chemical Company, Woburn, Mass.
Director of Research.

Pressell, G. W., 240 West Somerset Street, Philadelphia, Pa.
Chief Chemist, E. F. Houghton Company.

Pullar, C. A., 800 Argyle Road, Brooklyn, N. Y.
Salesman and Demonstrator, Ciba Company.

Remlein, F. L., 2007 Daly Avenue, Bronx, N. Y.
Colorist, Du Pont Company.

Roberts, H. D., Magog, Quebec.
Supt., Dominion Tex. Co. Print Works.

Roegner, E. W., Box 198, Rockaway, N. J.
Colorist, Weiss, Wilhelm, Inc.

Romero, J. G., Dighton, Mass.
Consulting Chemist, Arnold, Hoffman & Co.

Schroeder, H., Sayles Finishing Plants, Saylesville, R. I.
Textile Chemist.

Schuler, George H., 41 Zeigler Tract, Penn's Grove, N. J.
Colorist, Du Pont Company.

Shea, Jr., D. J., 1215 Filbert Street, Philadelphia, Pa.
Chemist, S. McDowell Company.

Tice, M. E., 47 Zeigler Tract Penn's Grove, N. J.
Demonstrator, Du Pont Company.

Wilkinson, E. A., Lonsdale, R. I.
Dyer, Lincoln Bleachery & Dye Works.

Wilmot, H. F., 85 Fort Green Place, Brooklyn, N. Y.
President, Tinctura Laboratories.

Junior Membership

Chapin, Dr. H. C., 290 Pine Street, Lowell, Mass.
Assistant Professor, Lowell Textile School.

Deane, R. J., 94 Campbell Street, New Bedford, Mass.
Chemist, American Printing Company, Fall River, Mass.

Morrison, A. W., 346 North Main Street, Andover, Mass.
Assistant Chemist, Washington Mills, Lawrence, Mass.

Nure, A. D., 914 Highland Avenue, Fall River, Mass.
Chemist, American Printing Company.

It was voted to set aside a page in the Secretary's Records in Commemoration of our late Councillor, James L. Amsden.

The matter of Corporation Membership was discussed but it was decided that nothing definite could be done by the Council, and the matter was deferred until the next Annual Meeting.

The Council voted that the Secretary should immediately send to the members a list of new applicants for membership.

Respectfully submitted,
W. E. HADLEY, Secretary.

FOURTH RESEARCH COMMITTEE MEETING

The Fourth Meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineers Club, Boston, Mass., on Friday, March 10, 1922.

The following members were in attendance: L. A. Olney, Wm. D. Livermore, Wm. H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee, M. R. Moffatt (representing Wm. K. Robbins), Wm. K. Moorhouse, W. J. Murray and R. E. Rose.

George A. Moran was elected Chairman of the Special Committee investigating the Fastness to Washing of Cotton Materials.

The following Subcommittee heads reported progress in the outlining of work which it is proposed to do in establishing standards of fastness, as follows:

George A. Moran, for Cotton.
Wm. D. Livermore, for Wool.
W. M. Scott, for Silk.

The series of washing tests for dyed silk, presented by Dr. Scott, Chairman of the Subcommittee on Silk, was adopted provisionally by the Research Committee and is as follows:

PROVISIONAL METHOD
Washing Test for Dyed Silk

Proposed by the Research Committee of the American Association of Textile Chemists and Colorists.

DIRECTIONS FOR TESTING
On Skeins

Take about a five-inch length of the dyed silk skein, divide it in three parts, and add to each part an equal amount of undyed silk, wool and cotton, respectively, then weave into a braid. Heat the soap solution to the designated temperature, then immerse the braid for two minutes. Remove the braid from the solution, pass it through a wringer, and then return to the soap solution again. Repeat this process until there have been five immersions in the soap of two minutes each, followed by a passage through the wringer. At the end, rinse the braid in cold water, extract and dry. Note staining of wool, cotton or white silk, also loss in shade of the dyed silk.

On Pieces

For this test use a piece about four inches square and duplicate the procedure described above. If the piece is a plain color, note simply change in shade. If there are colored stripes or any other pattern, note change in shade and also staining of the adjacent fabric.

SPECIFICATIONS FOR SOLUTION AND TEMPERATURE

Test No. 1—Soap Solution (1%) at boil
Test No. 2—Soap Solution (1%) at 160° Fahr.
Test No. 3—Soap Solution (1%) at 120° Fahr.
Test No. 4—Soap Solution (1%) at 85° Fahr.
Test No. 5—Equal volumes of soap solution (1%) and salt solution (1%) at 85° Fahr.

The soap used is the best grade of neutral tallow chip, such as Lux or Ivory Flakes.

Later on specific type dyes will be designated by the Committee as satisfactorily withstanding the five tests described above.

The Research Committee asks for criticism, suggestions and a full discussion of this, and all other, provisional methods that may be published.

It is only through such criticisms and suggestions on the part of individual members of the Association and others who may be interested that the official methods finally adopted may be acceptable to all who may be able to make use of them.

Provisional methods for washing of cotton and wool will be published later.

Respectfully submitted,
W. E. HADLEY, Secretary.

NOTICE OF MEETINGS

The next meeting of the Council will be held Friday, April 14, 1922, at the Engineers Club, Boston, Mass., at 4 P. M.

A meeting of the Research Committee will be held at the same place at 4.30 P. M. of the same day.

Members wishing to bring any matters to the attention of these meetings will please communicate with either the President or the Secretary.

The Executive Committee of the Northern New England Section is planning a meeting to be held about the

middle of April, to take the form of an "experience meeting" for discussion of the general subject, "Shady Goods." The date and place will be announced later.

CHANGES OF ADDRESS

The following changes and corrections in names and addresses of members should be noted:

K. A. Brownell
Standard Bleachery
Carleton Hill, N. J.

S. F. Carter
77 Lafayette Avenue
Passaic, N. J.

Edward M. Glennon
10 Arlington Street
Lawrence, Mass.

Thomas E. Kidd
P. O. Box 47
Wilton, Me.

Morton H. Wertheim
Kraemer Hosiery Company
Nazareth, Pa.

H. S. Morrow
16 Elton Street
Providence, R. I.

Frank J. Oesterle
Van Raalte Company
Paterson, N. J.

Philip C. Putnam
Apponaug Finishing Company
Apponaug, R. I.

W. H. Wingate
2132 Pawtucket Avenue
East Providence, R. I.

ADDITIONAL CHARTER MEMBERS

Through an oversight, the names of the following Charter Members were omitted from the original list published in the December 5, 1921, issue of The American Dyestuff Reporter and are herein given, together with their addresses and business affiliation:

Delys, Reni J. B., 52 Upland Road, Woonsocket, R. I.
Rosemont Dyeing Company.

Ferguson, Duncan, Box 107, Webster, Mass.
Dyer, S. Slater & Sons Company.

Wade, Joseph L., 6632 Elmwood Avenue, Philadelphia, Pa.
Chemist, Aberfoyle Manufacturing Company.

NOTICE FROM THE SECRETARY

Applications for Membership in the American Association of Textile Chemists and Colorists

All individuals who believe that they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those whom they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. Hadley, Secretary,
5 Mountain Avenue, Maplewood, N. J.

THE DEVELOPMENT OF TESTS FOR THE FASTNESS OF DYESTUFFS

By Wallace J. Murray
Contributions from the Laboratories of Arthur D. Little, Inc.

From the earliest times the fastness of dyestuffs has been of importance. The ancients must have had tests for fastness, and used them in selecting the fast colors which we find in fabrics of ancient and even prehistoric origin. As new natural products were found which would color fabrics, experiments must have been made to determine their value in actual use. In medieval times the distinctions between fast and fugitive colors were well known.

Until the introduction of synthetic organic colors, the number of dyeing materials was limited and tests of actual use were probably sufficient.

"Ure's Dictionary of Arts, Manufactures and Mines" (sixth edition), published in 1867, gives a good idea of the tests used at that time. The following quotation is from page 131 of Volume II:

"In trying the stability of dyes, we may offer the following rules: That every stuff should be exposed to the light and air; if it be intended to be worn abroad, it should be exposed also to the wind and rain; that carpets, moreover, should be subjected to friction and pulling, to prove their tenacity; and that cloths to be washed should be exposed to the action of hot water and soap. However, such tests are not at all applicable to most of the colors dyed upon cotton stuff. Not many of them can stand the action of hot water and soap, or even such acids as the juice of fruits. Indigo blue, one of the most permanent dyes on cotton, yields its intensity to every operation of washing, even in pure water."

Ure differentiates between permanent and fast colors. He shows that the rate of fading of a color depends upon the nature of the fiber and the humidity of the air.

From this time on the development of dyeing was rapid, and the development of dye testing kept pace with it. For a complete survey of this development one should refer to the papers listed in "A Bibliography of Literature on the Fastness of Dyes." (This journal, February 13, 1922.)

This paper will summarize a few of the more important of these papers, which fall into three distinct groups. The first describe tests performed for the purpose of classifying dyes according to their fastness. Since these do not concern the tests themselves but rather the dyestuffs, they fall outside the scope of this paper. The second describe work done on developing particular tests. The third describe complete series. These last two groups will be considered together, and summarized in the table at the end of this paper.

Fastness to Light

In the earliest tests the material was simply exposed to the sun for known lengths of time. It was apparent at an early date that this method was unsatisfactory, since the fading power of the sun was very variable. However, many light fastness tests are still reported in hours or days exposure to bright sunlight without any attempt at measuring intensity of the light. There are three possible methods of overcoming this difficulty, namely: (1) Measuring the intensity of the sunlight; (2) substitution of some constant light for sunlight; (3) substitution of a chemical reaction for actual light tests.

Methods of Measuring Light Intensity

In 1898 J. Hertzfield recommended the simultaneous exposure of the dyed material and cotton dyed with Turkey red or medium indigo. The rate of fading of these known dyes gave a measure of light intensity.

P. Dosne and others in a series of papers from 1900 to 1910 described a method based on exposing the dyed fabric and an actinometer to the sun. His actinometer consisted of two bulbs, one blackened and protected with a vacuum jacket and the other clear. A volatile liquid was placed in the black bulb and the amount distilling over to the clear one measured the intensity of the light.

Lange in 1903 used a series of fast dyes of various colors, such as Indigo, Alizarine, Tartrazin, etc., as standards. The sample was compared with a standard of similar color. The rate of fading measured the light. These standards were dyed in various tones to get variable degrees of fastness, since pale tones are always much more fugitive than heavy ones.

Krais in 1911 brought out his bleach-hour method. He prepared sensitive papers by coating unsized paper with clay dyed with Victoria Blue, using gum arabic as a binder. Standard papers were prepared by exposing these sensitive papers for one, two, three, four and five hours to constant, bright sunlight, representing one, two, three, four and five bleach hours. In making the test the sample was exposed to sunlight with a piece of sensitive paper. As fast as the paper faded it was removed and replaced by a fresh piece. All these papers were saved. When the sample first showed signs of fading, all the papers were compared with the standards to determine how many bleach hours each had been exposed. The bleach hours of all the papers were added together to determine the total bleach hours of the sample. This process has been criticised because of: (1) The fading power of light of different lengths is not the same on the blue standard as on other colors; (2) the large number of color comparisons leads to inaccuracies; (3) it is difficult to make the papers absolutely uniform.

In 1914 the German "Echtheitskommission" recommended that a series of standard dyes of graded fastness be exposed with the sample. One color is given for different fibers. In 1916 the revised table contained these tests unchanged.

Attempts to Use Artificial Lights

A great deal of work has been done on this subject, particularly by various electrical manufacturing firms wishing to sell apparatus.

In 1911 A. Scheurer carried out a series of experiments comparing the mercury arc with sunlight. He showed the excessive effect of this light on benzo dyes and its comparatively slight effect on Indigo.

In the same year Gebhard proposed a light containing both a carbon and a mercury arc.

In 1915 Mott presented a paper to the American Electrochemical Society on the flaming arc in dye testing. This article gives a good bibliography of the subject. According to him, the high amperage arc reproduced sunlight conditions except in speed, the arc being much more rapid.

In 1921 Gordon compared sunlight in Arizona and New Jersey, the violet carbon arc, R. U. V. and Hanovia Quartz mercury arcs. He finds the carbon arc very similar to sunlight.

(To be concluded.)

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Advisory Editor

LAURANCE T. CLARK
Managing Editor

Published biweekly by

HOWES PUBLISHING CO., INC.
4109 Woolworth Building, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year: Canadian $5.50; foreign $6.00.

Vol. X March 27, 1922 No. 7

A DISTINCTION

OF all the arguments and testimony introduced during the Senate "dye monopoly" investigation, which will be further discussed in future issues, none which had been offered up to the moment of writing had eclipsed in importance, to the general public, a certain distinction pointed out by Irenee du Pont, President of E. I. du Pont de Nemours & Co.

Besides proving the now defunct Du Pont-Levinstein agreement to have been pronounced entirely legal by Senator Wolcott, declaring the records of his company to be "wide open" to the investigators, and shedding some exceedingly interesting light on the competition which exists within the ranks of the American dye industry to-day, Mr. du Pont stated, apropos of the "lobbying" charges of Senator King:

"We [the Du Ponts] have been here frankly and openly. We want the best protection we can get against the German Cartel. We have signed our statements and have nothing to take back. If that is a lobby, then we confess we are one."

Mr. du Pont declared that his concept of a lobby was the organized circulation of "lies and misleading propaganda" by those who do not dare let it be known that they are connected with the work.

"I can make no charges," he added, "but such propaganda has been circulated, and I naturally suspect that it is the work of the real trust, the German Cartel; for that trust does not want the American industry to thrive."

This is the answer to the whole series of absurd charges concerning "propaganda." It is a distinction which has always been present, has been vaguely realized by many, even among the public—and expressed by few.

The public has repeatedly been told by one faction that the German dye makers were circulating propaganda to help maintain their supremacy, and it has repeatedly been told by another faction that the American dye makers were circulating propaganda. Therefore, by implication, one was as bad as the other.

As a matter of fact, even straight advertising is one form of propaganda. Speeches made at public gatherings such as women's clubs, scientific associations, etc., are propaganda. But the Germans never worked that way—and indeed, must have regarded the efforts to tell the truth about the American dye industry and the real necessity for the preservation of our coal tar chemical industries in general, as highly amateurish in comparison with the finished methods employed by agents of the Cartel, who go at it by devious and roundabout ways. As we have tried to point out before, propaganda of a sort is necessary in any kind of an undertaking dependent upon public support for its furtherance. But there are ways of enlisting this support which are regarded as legitimate by everyone, and ways which are regarded as illegitimate because they do not put the proposition squarely up to the final arbiters for an unbiased decision. One seeks to call attention to whatever claims to merit an institution or a movement or a business proposition may possess, leaving the public to judge whether it will accept or reject it. The other seeks by every means at hand to belittle, and discredit, thereby automatically creating favor for its own proposition by turning the judges against the other. One is open, says what it means, and offers the public a choice. The other is secret, circulates malicious falsehoods, and in a hole-and-corner fashion tries to indicate flaws, whether they exist or not. One tries to build up, the other to pull down.

Mr. du Pont is to be thanked for so effectually showing the Senate Committee the essential difference betwen the American and German methods.

"THE WORLD DO MOVE"

ONE of the several forms of inertia with which those urging adequate protection for the American dye industry have had to contend, has been that type of intellect which seems wholly unable to distinguish between fundamental principles for the conduct of national life, and what may be called superficial, or political principles—principles of expediency. The latter should always be governed by the former; but may, without violating any of them, be to the former as the waves to the tides, or the top soil to the bedrock beneath. They must be ever changing to conform to new conditions, and it is unwise to allow them to become traditional.

To the first class belong such principles as honor, charity for the unfortunate and afflicted, liberty, democracy and others which are part and parcel of the American creed and which are just as binding upon us in our day and age as they were in George Washington's. To the second class belong such principles as determine whatever foreign policy may be best suited to the changing seasons of strife or peace, the tariff of the moment, etc. These have been altered, over-

turned, rearranged and restored repeatedly, and usually because of necessity. Yet there are some who persist in thinking each time that the latest should be the last.

These may find evidence to the contrary on every hand. They may discover, if they will but look abroad occasionally, that all the nations dance to the same tune of expediency—usually without violating their fundamental policies, good, bad or indifferent as the case may be. And as a recent example of this kind we refer them to certain portions of an article by Maximilian Toch, of New York, who is well known in chemical circles. Writing in the "Journal of Industrial and Engineering Chemistry" of a recently completed European tour, Mr. Toch says:

"England has always been a free trade country, but since the war she has seen her industries slipping, with every indication of going under, and has enacted a general tariff bill, called the 'Safeguarding of the Industries Act' in which a duty of 33 1/3 per cent has been placed on all industries which need protection, such as optical glass and optical instruments; scientific glassware; laboratory porcelain; synthetic colors, rare earths, and chemicals. In addition, an Anti-Dumping Act has been enacted, which became a law on October 1, 1921. I can quote only Part 2, Section B, of the Anti-Dumping Act of England, which relates to the depreciation in value of foreign currency, which we would do well to follow:

"'Evidence as to price at which similar goods can be profitably manufactured in the United Kingdom.

"'Evidence to show that the depreciation in relation to sterling of the currency of the country of manufacture is responsible for the fact that the prices at which the goods are sold or offered for sale in the United Kingdom are below the prices at which similar goods can be profitably manufactured in the United Kingdom.'

"In addition to this, England has protected her dye and synthetic chemical industry by means of embargoes and prohibitions which prevent some foreign chemicals from coming into the country.

"The condition in France is still more interesting, for France has enacted a tariff, known as the Law of September, 1921, which is composed of four distinct types of tariff. They are known as the 'old tariff,' 'new tariff,' 'favored nation tariff,' and the 'coefficient.'

"The 'old tariff' is the one which existed prior to that date, and applies to some materials not made in France, and others not indigenous to France. The 'new tariff,' generally speaking, is a very high tariff on certain chemicals and manufactured articles. The 'favored nations tariff'—from which the United States is conspicuously absent—favors those countries which France has chosen; but the most important and interesting part is the 'coefficient.' This is a number, 2, 3, 4 or more in the fourth column of the Tariff, which in every instance is used as a multiple of the duty assessed. In other words, precipitated barium sulphate is assessed at 2 francs per 100 kilos, and includes the coefficient 5; therefore, it is dutiable at 10 francs per 221 pounds.

So much for what other nations have seen fit to do in order to meet changing conditions following upon the war. Further along, the writer says:

"The condition in Germany is exceedingly interesting in view of the fact that by far the largest part of the plants in Germany are working nights. There is no unemployment, as there is no foreign competition. As I pointed out to the Treasury Department last summer (in June, 1921), Germany, in addition to her high tariffs, has a list of embargoes which precludes the importation of any material which can be made in Germany out of German raw material. If we wished to retaliate by shipping 1,000 tons of barium peroxide to Germany at five cents per ton it could not be done, because the material could not enter any of the customs ports of Germany.

"The man who goes to Berlin, lives at a fine hotel, and orders the best wine for a few cents a bottle in our money, and then comes back talking about how prosperous Germany is, is not acquainted with the facts. It is true that Germany is working very hard, and that one passes hundreds of factories brilliantly illuminated at night, particularly in the iron district near Essen, but the workman is being paid in currency that is continually depreciating, and the savings which he put aside last year, when the mark was worth 1.6 cents, have depreciated until now their purchasing power is far less than it was a year ago, and their international value has fallen to half a cent."

Many of our legislators in Washington have taken account of these conditions abroad, and are shaping their recommendations accordingly; others, however, do not, or will not, recognize the fact that "the world do move," and that while things will change from their present aspect into something else, just as certainly as they changed from their former aspect into the present one, nevertheless at present they are as they are, not as they were, and must be dealt with by present-day methods instead of traditional ones. What these present-day methods consist of, as applied to the case in point, may be seen by the conduct of France and England, who are a trifle closer to the music than we. In other words, there is no law against changing methods of doing business in any line just so long as the fundamental principles of honesty are not violated, and according to The REPORTER'S view, it is entirely honest and American to adopt whatever legitimate protective style happens to be in vogue. In this matter of protecting home industries, each country has reserved the right to be pretty much a law unto itself anyway, and since the penalty for overstepping the accepted bounds has always been the loss of foreign trade, there is little danger in allowing each one to shape its own commercial policies.

Further, he who believes America can maintain trade policies of twenty or even ten years ago, in the face of the present trend, must indeed have great faith in the existence of latter-day miracles.

By way of a conclusion to his very interesting observations on the status of our late military and present commercial antagonist, Mr. Toch offers the view that "as far as stocks of raw materials and finished products in Germany are concerned Germany will soon come to the end of her tether in the matter of textiles, for, with their depreciating mark, they are unable to buy cotton, wool, and silk at competitive prices. As far as chemicals are concerned, Germany has enough raw material to undersell the world for many years."

Which fact will repay further study and action looking to a possible emulation, with such modifications as may seem expedient, of course, of the policies of our friends in Western Europe, who apparently have been living in this world long enough to realize that it is perpetually on the move.

THE 1923 SILK EXPOSITION

ALTHOUGH it will not take place until nearly a year from now, plans are already well under way for the Second International Silk Exposition, to be held under the auspices of the Silk Association, February 5 to 15, 1923, at the Grand Central Palace, New York. And although the prime object of the affair, as heretofore, will be first, last and always the promotion of the silk industry, we again take occasion to remind the dye manufacturers of America that their best efforts to aid and co-operate with the various committees in charge of this truly lovely spectacle, will not be wasted.

It is altogether likely, however, that the dye people do not need this reminder, which is more in the nature of "a word to the wise" than an attempt to impart information. For they comprehend full well that of all the various trade showings of one kind or another, not excepting the Chemical Show, the Textile Show and the numerous fashion shows which are always taking place, none provides a better opportunity for an effective and lasting demonstration of their resources.

This is true for a number of reasons. In the first place, the Silk Show enjoys an attendance by the general public which compares favorably with any. Then, its appeal to the senses of those who delight to revel in the sheer beauty, for its own sake, of color harmonies ranging from the gorgeous to the subdued, is both powerful and permanent. Again, the finest achievements and capabilities of our dye makers can probably be expressed to the best advantage through the medium of silken fabrics Again, the elaborateness with which the Silk Show is staged by its promulgators, who will spare no pains or expense in order to make it truly representative of this great industry, gives assurance that all possibilities in the way of delicate tints and shades (we employ, for the nonce, the language of ordinary conversation and not the strictly scientific terminology advocated by Mr. Low) will be exhausted for the display. And finally, the event will again be exploited from one end of the country to the other by means of "Silk Week," during which department stores will devote special windows to showings of the latest creations in silk.

As has been pointed out in these and other columns before, the main factor on which the Silk Show relies to obtain its irresistible appeal to both feminine and masculine representatives of the general public, is color. This is by no means a disparagement of the wonders wrought in various weaves and designs in costume; but the fact remains that without the infinite variety of color combinations at the disposal of the designers, their work would become well-nigh meaningless when judged by the standards of to-day, and that the first impression received by the visitor to the Silk Show, as well as the last one carried away, is the almost bewildering array of color. It is desirable that readers again be reminded of the fact that the silk industry, as at present constituted, is the dye industry's fairest daughter, and that this self-same public which storms the doors, blocks the aisles and stands on tip-toe to view the interior of booths displaying colored silk fabrics, be so reminded when the proper time arrives.

IMPROVED PROSPERITY THROUGH IMPROVED COMMERCIAL STANDARDS

A POWERFUL and vigorous organized effort is gaining momentum in business to-day to eradicate the barnacles and impediments of business practice, particularly the obstacle of bribery and secret commissions.

Fair and honest dealing in business is the foundation of confidence. "It pays to be honest—in the cash drawer it pays best." Without it quality goods, advertising, salesmanship, do not make sales. It is the very cornerstone of our whole economic civilization.

Yet evil persists, and calls for courage on the part of business men to "clean house" and, in fact, to work for the enactment of better laws on the subject While it is true that commercial bribery is more rampant in some industries than in others, the hard fact is that it has a tendency to spread if not suppressed; and both buyers and sellers generally are affected, to say nothing of the consumer whose costs are inevitably increased by the baneful evil.

American business faces a hard task at home and abroad to increase prosperity and trade, and logic and common sense as well as the moral ideal of American business, call for extermination of the barnacles of dishonesty and malpractice. In years past, American business was splendidly advanced by the establishment, through the efforts of a great dry goods merchant, of the fixed price in place of haggling barter; and later by the abolition of secret rebates, etc. The next great moral step should be the abolition of commercial bribery by a Federal statute which has already been framed and recommended for passage in Congress by the Committee of the Judiciary.

An organization which has adopted the name of the

Commercial Standards Council has recently been formed. Its membership comprises earnest, thinking men, who themselves are for the most part executive officers in a large number of business associations of national importance, such as the Synthetic Organic Chemical Manufacturers Association of the United States, the National Association of Purchasing Agents, the Association of National Advertisers, the National Association of Credit Men, the Associated Advertising Clubs of the World, the New York Sales Managers Club, the Philadelphia Sales Managers Association, the American Association of Pyroxylin Manufacturers, the American Ship Service Corporation, the American Society of Sales Executives, the National Wholesale Grocers Association, the National Association of Printing Ink Makers, the National Association of Office Appliance Manufacturers, the Insecticide and Disinfectant Manufacturers Association and many others.

The general object of the Commercial Standards Council is to foster and maintain higher standards in business. It has, however, as its immediate, specific aim the elimination of the corrupt and growing practice of commercial bribery. To this work it proposes to devote its first, vigorous attention, and it is supporting national legislation for the suppression of this form of business graft.

The secret giving of commissions, money, or other things of value to employees of customers, for the purpose of influencing their buying powers, is a dangerous evil more widespread than is acknowledged, and one which is growing.

Those concerned with both the dye and textile industries, to go no further, know of at least one important phase of industry wherein this form of corruption was practised by a foreign competitor to the eventual great detriment of both domestic trades. And for this reason alone they should be particularly interested in co-operating with and supporting any organization whose principal object is the stamping out of all present manifestations of this evil and the prevention of its future recurrence.

There is pending in Congress a bill, H. R. 10159, introduced at the direction of the House Committee on the Judiciary, on January 27, 1922, entitled "A Bill to further protect interstate and foreign commerce against bribery and other corrupt trade practices." This bill is now No. 133 on the House Calendar.

Full details as to the provisions of this proposed law may be had from the secretary of the new organization, H. J. Kenner, 110 West Fortieth Street, New York City, and readers are urged to investigate further and, upon being satisfied as to the standing of the Commercial Standards Council, to act if possible upon its suggestions.

TRIPHENYL-METHANE COLORS

British Dyestuffs Corporation, Ltd., have patented a process (B.P. 165,658) for preparing new triphenyl-methane colors by condensing 2.4 dichloro-5-nitro-benzaldehyde and the corresponding 2-4-5-tri-chlor-benzaldehyde with a mono-alkyl-ortho-toluidine, and oxidizing the leuco body obtained. The coloring matters produced are pure greenish blue basic dyes of superior fastness to light.

GUESSWORK IN THE DYEHOUSE

(*Concluded from page 228.*)

Lettle, how much less should one try to guess at temperatures other than 212 deg.?

Can you afford to be inaccurate? You do not guess at the amount of dyestuff you add to the dye bath; you weigh it. Then why do you guess at the temperature at which you dye, when it can be measured easily and accurately? In matching you endeavor to duplicate the amounts of dye, acid, or mordant, length of time in the bath, etc., as near as possible. You keep records of these facts, but have you any data concerning the temperatures? Often those perplexing little differences between two or more batches or pieces which occasionally turn up can be traced to a difference in temperatures somewhere along the line.—"Canadian Dyer and Color User."

ACID WOOL DYE ON COTTON

A German patent for the production of shades fast to light on vegetable fibers is based upon the fact that gelatine is rendered insoluble by formaldehyde. The material is treated in a solution containing gelatine acid wool dye and glycerine at a temperature under water boil. An after treatment with formaldehyde, either gas or solution, is then given, after which the material is dried and calendered.

THE INFLUENCE OF THE CONCENTRATION OF BLEACH LIQUORS ON THE STABILITY OF COTTON IN PROLONGED CHLORINE BLEACHING

P. Herman and H. Frederking; Textilberichte, 1921, 2, 428, through Journal of the Textile Institute.

If sufficient chlorine is present the velocity of bleaching is proportional to the concentration, but if the chlorine content is low it depends on the rate of diffusion. The thicker the fiber is, the more rapidly it should be bleached. The authors have carried out a series of experiments, using the same material and bleach as in a previous communication (see *JI.*, 1921, 12, 446). The duration of each bleaching was 75 minutes with a chlorine content of 1:1,000; 5, 10, and 16 bleachings reduced the tensile strength to the same extent as 18, 35, and 50 with a 0.5:1,000 concentration. Comparing a concentration of 2:1,000 with 1:1,000 active chlorine 4, 10, and 20 bleachings resulted in the same reduction in strength as 10, 28, and 50 with a concentration of 1:1,000. Seven bleachings with 2:1,000 concentration gave the same loss in strength as 50 of 0.5:1,000. Generally, by doubling the chlorine concentration the loss in stability was increased threefold. The weight per square meter was reduced about 9 per cent. The elasticity in the case of concen-

trations of 2:1,000 fell about 20 per cent, but in the case of 1 1,000 it rose to a maximum of 113 per cent after twenty experiments and then fell to 105 per cent after 50 bleachings.

Foreign Dyes Licensed by Treasury Department for February Import

Swiss Contribution Nearly Four Times That of January—Germany Makes Substantial Gain—England Falls Off

LICENSED imports of dyestuffs for February, which totaled 400,269 pounds, were nearly double the January importations, which were but 201,221 pounds. This is likewise a large gain over the 308,787 December total, and was the largest amount licensed for importation to this country since last November, when the total was 768,858 pounds.

Germany, leader for the month, bettered her January figure of 117,275 pounds by sending us 161,012 pounds in February. England, on the other hand, slumped from 46,550 pounds in January to 25,500 pounds during the second month of 1922. Principal responsibility for the great total increase in poundage lies with Switzerland, which sent us 113,757 pounds as against the unwontedly small contribution of 37,396 pounds made during January.

Following is the complete list giving the types and quantities of dyestuffs for the importation of which into the United States licenses were granted by the Treasury Department, Division of Customs, Dye and Chemical Section, during February. This tabulation is being issued by the American Dyes Institute, and it is announced that anyone interested in the manufacture of dyestuffs who has not received a copy may obtain one by application to that organization's headquarters, 320 Broadway, New York City.

An appended note by the Treasury Department states: "Licenses shown by this list to have been issued for particular commodities must not be considered as a precedent or assurance that favorable action will be taken on future applications for similar commodities. The Treasury Department, Dye and Chemical Section, announces in special cases that it is its practice to consider any special evidence that may be submitted by manufacturing consumers of dyestuffs tending to prove that the American commodity, while satisfactory in general or for some lines, will not meet the requirements as to quality or adaptability for particular manufacturing purposes."

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Acid Alizarine Black R	2,118	8,000
Acid Alizarine Gray G	5	....
Acid Anthracene Brown R	1,000	....
Acid Anthracene Brown RH Extra	1,000	....
Acid Cyanine BF	5	....
Acid Magenta	125	....
Acid Ponceau EXEX	....	551
Acid Rhodamine BG	100	....
Acid Pure Blue R Supra	....	2,800
Algol Brown G Powder	75	....
Algol Brown R Paste	125	....
Algol Corinth R Paste	500	....
Algol Pink R Paste	10	....
Algol Red B Paste	2,500	....
Algol Red FF Extra Paste	575	....
Algol Red 5G Paste	225	....
Algol Yellow 3G Paste	500	....
Alizarine SDG Paste	50	....
Alizarine Astrol B	820	....
Alizarine Black S Paste	1,000	....
Alizarine Black T	5	....
Alizarine Blue SAE	250	....
Alizarine Blue SB Powder	100	....
Alizarine Blue SKY	130	....
Alizarine Blue SAWSA	100	....
Alizarine Blue Black B Powder	100	....
Alizarine Blue Black 3B	1,400	....
Alizarine Blue Black BT	500	....
Alizarine Bordeaux BB	5	....
Alizarine Celestol R	1,000	....
Alizarine Cyanine GG Powder	3,000	....
Alizarine Cyanine Green G Ex. Pdr.	900	....
Alizarine Delphinol BB (from England 1,200 lbs.)	....	....
Alizarine Emeradole G	100	....
Alizarine Fast Light Blue SE	....	500
Alizarine Green S Paste	500	....
Alizarine Indigo 3R Paste	1,000	....
Alizarine Indigo Green B Paste	594	....
Alizarine Irisol R	800	....
Alizarine Light Blue SE	....	4,200
Alizarine Orange Paste	800	....
Alizarine Orange AO 20% Paste (from England 500 lbs.)	....	....
Alizarine Red S	400	....
Alizarine Red SDG	200	....
Alizarine Red SX 20% Paste	450	....
Alizarine Red W Powder	800	....
Alizarine Rubinole 3G	550	....
Alizarine Rubinole GW Powder	2,000	....
Alizarine Rubinole R Powder	1,001	....
Alizarine Saphirol B	800	....
Alizarine Saphirole SAE	250	....
Alizarine Saphirole SE	900	....
Alizarine Saphirole SE Conc	560	....
Alizarine Saphirole WSA	552	....
Alizarine Sky Blue B Powder	1,250	....
Alkali Blue 3R Conc	2,000	....
Alkali Fast Green 3G	300	....
Anthracene Blue SWGG Ex. Powder	25	....
Anthracene Blue WG Paste	1,500	....

Designation of Dye	Germany (lbs.)	Switz. (lbs.)
Anthracene Chrome Brown EB	3,505	....
Anthraflavone G	475	....
Anthraflavone GC	2,200	....
Anthraquinone Blue Green BX	?	....
Anthraquinone Blue Green BXO	442	....
Azure Blue N	500	....
Benzo Copper Blue 2B	1,000	....
Benzo Fast Black L	600	....
Benzo Fast Blue G	201	....
Benzo Fast Blue 4GL	900	....
Benzo Fast Brown 3GL	500	....
Benzo Fast Heliotrope BL	520	....
Benzo Fast Heliotrope 4BL	10	....
Benzo Fast Red 8BL	500	....
Benzo Fast Heliotrope BL	10	....
Benzo Fast Heliotrope 2RL	50	....
Benzo Fast Orange 2RL	50	....
Benzo Fast Red 8BL	1,320	....
Benzo Fast Yellow GL Extra	500	....
Benzo Fast Yellow RL	50	....
Benzo Light Blue 4GL	220	....
Benzo Light Bordeaux 6BL	50	....
Benzo Light Brown 3GL	100	....
Benzo Light Orange 2RL	2	....
Benzo Olive	100	....
Benzo Red 12B	1,220	....
Benzo Rhoduline Red 3B	100	....
Benzo Violet O	448	....
Biebrich Acid Violet 7B	100	....
Black Lake	50	....
Brilliant Benzo Fast Violet BL	271	....
Brilliant Benzo Fast Violet 4BL	57	....
Brilliant Benzo Green B	200	...
Brilliant Benzo Violet B	501	....
Brilliant Benzo Violet 2RL	101	....
Brilliant Fast Blue B	50	....
Briliant Fast Blue GG	50	....
Brilliant Indigo 4G	201	....
Brilliant Milling Blue	50	....
Brilliant Milling Blue B	105	...
Brilliant Sky Blue 8G Extra	55	....
Brilliant Sulphon Red B	..	3,250
Brilliant Sulphon Red 10B	....	1,000
Brilliant Wool Blue FFR Extra	25	....
Carbazol Yellow W	10	....
Chinoline Yellow	....	2,000
Chinoline Yellow KT Ex. Conc	1,920	....
Chloramine Red B	....	5,710
Chloramine Red 3B	....	3,100
Chloramine Red 8BS	3,200	....
Chloramine Red 8BS Conc	2,250	....
Chlorantine Fast Bordeaux 3BL	....	660
Chlorantine Fast Red 7BL	....	239
Chlorantine Violet 4BL	....	561
Chlorantine Fast Yellow 4GL	....	440
Chlorantine Fast Yellow RL	....	440
Chlorazol Fast Red K (from England 100 lbs.)	....	....
Chrome Acetine Blue S	....	220
Chromexan Brilliant Blue G	110	....
Ciba Blue 2B Powder	....	968
Ciba Blue 2BD Paste	....	3,850
Ciba Blue G	....	3,630
Ciba Bordeaux B Paste	....	220
Ciba Green G 10% Paste	501	....
Ciba Orange G Powder	....	330
Ciba Pink BG 20% Paste	....	55
Ciba Red R 20% Paste	220	300
Ciba Rose BG	....	440
Ciba Scarlet G 20% Paste	....	165
Ciba Scarlet G Powder	....	440
Ciba Violet B Paste	....	4,400
Ciba Violet B Powder	....	1,100
Ciba Violet 2B Powder	....	220
Ciba Violet R	....	1,210
Cibanone Blue 3G Paste	....	330
Cibanone Orange R	....	55
Congo Orange G	200	....
Cross Dye Green 2G Conc. (from England 1,900 lbs.)	....	....
Cyananthrol BGA	125	....
Cyananthrol BGAOO	1,005	....
Cyananthrol RXO	301	....
Cyanole FF	5	....
Cyanole Extra	36	....
Delta Purpurine 5B Extra	220	....
Delta Purpurine 5B	220	....
Developer NB	....	250
Diamine Azo Orange 2R	10	....
Diamine Brown B	100	....
Diamine Bronze G	25	....
Diamine Catechine B	175	....
Diamine Catechine 3G	50	....
Diamine Cutch	10	....
Diamine Fast Black XN Ex. Conc	5	....
Diamine Fast Bordeaux 6BS	599	....
Diamine Fast Orange EG	400	....
Diamine Fast Orange ER	500	....
Diamine Orange F	10	....
Diamine Scarlet 3B	500	....
Diamine Steel Blue L	10	....
Diaminogene Sky Blue N	10	....
Diaminogene Blue NA	4,000	....
Dianol Violet R (from England 300 lbs.)	....	....
Diazamine Blue BR	....	500
Diazanil Pink B	200	....
Diazine Black	250	....
Diazine Black G	500	....
Diazo Brilliant Black B	2,700	....
Diazo Brilliant Scarlet 6B Extra	251	....
Diazo Brilliant Scarlet 2BL Ex. Conc.	1,000	....
Diazo Brown 3G	200	....
Diazo Light Violet BL	25	....
Direct Brown 2G	....	3,300
Direct Catechine GR	....	660

Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Eclipse Brown 3GK	....	4,500
Erio Chrome Red B	....	2,750
Erio Chrome Verdon S	....	5,500
Euchrysine GRNTN	440	....
Euchrysine RRD	135	....
Fast Acid Blue B	200	....
Fast Acid Magenta G	100	....
Fast Green Bluish	500	....
Fast Green Extra Bluish	100	....
Fast Light Yellow 2G	200	....
Fast Mordant Yellow G Powder	20	....
Gallophenine W	500	....
Genuine Madder Lake YS Yellow Shade (from England 300 lbs.)	....	....
Geranine G	12	....
Guinea Violet 4B	2,000	....
Hansa Yellow G	1,000	....
Hansa Yellow 5G	1,000	....
Helindone Brown G Powder	110	....
Helindone Brown 2R Paste	1,102	....
Helindone Green G Paste	100	....
Helindone Pink AN Paste	800	....
Helindone Pink AN 10% Paste	400	....
Helindone Pink B Extra	200	....
Helindone Pink BN	1,975	....
Helindone Pink R Extra Paste	250	....
Helindone Red 3B Paste	500	....
Helio Bordeaux BL Powder	50	....
Helio Fast Violet AL	160	....
Hydron Blue G 30% Paste	510	....
Hydron Blue R 30% Paste	1,300	....
Hydron Bordeaux B Paste	50	....
Hydron Bordeaux B Double Paste	20	....
Hydron Bordeaux R Double Paste	20	....
Hydron Brown G Paste	70	....
Hydron Brown R Paste	70	....
Hydron Green B Paste	20	....
Hydron Green G	20	....
Hydron Orange R Paste	70	....
Hydron Pink FB Paste	270	....
Hydron Pink FF	295	....
Hydron Scarlet BB Paste	21	....
Imperial Scarlet 3B	100	....
Indanthrene Blue BCS Powder	23,150	....
Indanthrene Blue GCD Dbl. Paste	2,000	....
Indanthrene Blue 3G Powder	500	....
Indanthrene Blue RS Triple Powder	50	....
Indanthrene Claret B Extra Paste	2,450	....
Indanthrene Golden Orange G Dbl. Paste	700	....
Indanthrene Golden Orange RN Ex.	500	....
Indanthrene Golden Orange RRT Paste	9,325	....
Indanthrene Pink B Dbl. Paste	500	....
Indanthrene Red BN Extra Paste	1,500	....
Indanthrene Red Violet RRN Paste	1,000	....
Indanthrene Violet BN Ex. Paste	5,500	....
Indanthrene Violet RR Extra	50	....
Indigo MLB6B	200	....
Indocyanine B	5	....
Indocyanine RRF	5	....
Ink Blue Aniline BJTNO	300	....
Janus Red B	220	....
Light Green SF Yellowish	200	....
Lithol Fast Orange R Powder	1,000	....
Metachrome Blue Black 2BK	500	....
Methyl Lyons Blue	....	500
Methyl Silk Blue New	....	500
Methyl Violet 6B 80 yaroz	55	....
Methyl Violet NFS	50	....
Methylene Blue BG Conc	25	....
Methylene Green G	25	....
Milling Yellow 3G	50	....
Milling Yellow O	100	....
Memoza Z Conc	....	2,700
Naphtogene Blue B	2,025	....
Naphtamine Fast Blue B	250	....
Naphtamine Fast Green B	100	....
Naphtamine Fast Green Y	250	....
Naphtamine Fast Violet 2B	50	....
Naphtamine Yellow BN	25	....
New Methylene Blue N	11	....
Night Blue	5	....
Nigrosine T	500	....
Nigrogene B	200	....
Nile Blue BX	5	....
Nitrosamine Paste	50	....
Omega Chrome Red B	....	2,000
Oxamine Acid Brown G	2,000	....
Oxydiaminogen ED	200	....
Paper Fast Bordeaux B	25	....
Patent Blue V	4,000	....
Patent Phosphine G	....	440
Patent Phosphine R	....	110
Peri Wool Blue B	100	....
Peri Wool Blue G	100	....
Permanent Red	50	....
Phosphine Extra	5	....
Phosphine 3R	2,100	....
Prune Pure	....	3,000
Pyramine Orange R	1,000	....
Pyrazole Orange G	....	6,500
Pyrogene Direct Blue RL	....	480
Pyrogene Direct Blue RL Conc	....	400
Pyrogene Yellow Brown RS	....	660
Rapid Fast Red B	10	....
Rapid Fast Red GL	10	....
Rhodamine B Extra	75	..
Rhodamine G	22	....
Rhodamine 6GDN Extra	700	....
Rhodamine 6GH	....	55
Rosanthrene R	....	55
Rosanthrene Orange R	....	55
Rosinduline 2B Bluish	2	....

Designation of Dye	(lbs.) Germany	(lbs.) Switz.
Rosinduline GFX	353	....
Saba Phosphine 2G Conc	....	2,000
Saba Phosphine N Conc	....	2,000
Sulphur Pyrogene Green 3G	....	308
Supramine Yellow R	50	....
Thiazine Red RXX	10	....
Thioflavine	....	500
Thioflavine T	35	....
Thiogene Violet B	5,000	....
Thio Indigo Rose BN Extra Paste	310	....
Thionol Brilliant Green GG	....	7,000
Thionol Brown R (from England 5,000 lbs.)	....	....
Thionol Green DY (from England 200 lbs.)	....	....
Thionol Yellow GR (from England 10,000 lbs.)	....	....
Thionol Yellow 3RD (from England 5,000 lbs.)	....	....
Triazol Discharge Brown GGX	....	1,100
Trisulphon Bronze B	....	2,000
Trisulphon Brown B	....	2,000
Trisulphon Brown GG Conc	....	3,000
Turquoise Blue G	50	....
Ultro Violet NO	....	1,000
Ursol DF	100	....
Vat Pink B Extra	110	....
Vat Pink R Extra	10	....
Victoria Blue B Conc	35	....
Viridin Lake	700	....
Viridin S Powder	5	....
Washmarine	110	....
Water Blue	200	....
Wool Fast Blue BL	500	....
Xylene Cyanol FF Extra	....	509
Xylene Red B	....	2,000
Yellow Developer C	....	1,320
Yellow Developer G	....	220
Bronze Blue	10	
Madder Lake	60	....
Madder Lake (from England 1,000 lbs.)	....	....
Madder Lake BB Extra	60	....
Reflex Blue 1048K	10	....
Blue Lake 41	1,000	....
Totals:		
Germany		161,012
England		25,500
Switzerland		113,757
Grand Total		400,269

The Phoenix Knitting Works, Inc., 208 Broadway, Milwaukee, Wis., is about to erect a large new concrete building for a central dyeing and finishing plant, the estimated cost of which is $400,000. Lockwood, Greene & Co., of Boston and Chicago, are the engineers.

FASTNESS TO LIGHT

By E. W. Pierce

(*Continued from page 222.*)

the samples for the same time until one or the other shows signs of fading. This, in fact, is almost as far as we dare go and the meager information has to satisfy us.

We may be operating a mill and have a desire to enter a bid on a Government contract. We find that after enumerating exactly the quality of the stock, weave, weight, finish, etc., and several very positive chemical tests, we are informed that the sample must stand thirty days' exposure as well as the standard sample. No account is taken as to the part of the year which shall furnish those thirty days; the latitude, however, may be presumed to be that of Philadelphia.

It is easy to see how the mill chemist might deceive himself regarding the actual fastness of the dyes he intended using, should he make his exposures in December and then have the Quartermaster's chemist reject the goods after a test in August.

Comparative Fastness, and Strength of Dyeings

A case like this would be rather easy to control, because the tests are made on a definite shade and strength of color; but should we wish to know the comparative fastness of, say, Tartrazine and Crystal Orange GG, or Alizarine Saphirol, another difficulty arises. As a 2 per cent dyeing of any color requires twice as long to fade as a 1 per cent dyeing, and as each particular dye has its own independent strength (compared to its own chemically pure grade), there is no reason why each dye should be tested at 1 per cent. nor is there any measure which will tell us how strong each respective dye should be dyed in order to be on an equal basis with the others.

Method of Testing for Comparative Fastness

We might proceed, as in the test for level dyeing, by selecting from each class of dyestuffs a blue, red and yellow of the very highest fastness to light, and from them determine a formula for a neutral gray. Then, whenever a dye of any class was to be tested, omit its equivalent from the gray and rematch the gray, using the new color which is being tested. Several yellows of various tones, likewise blues and reds, would then each form part of a number of grays of equal shade. A comparative exposure of these samples would then show us how equivalent quantities of similar colors stood the exposure, rather than how an arbitrary 1 per cent of each was affected.

Variability of a Given Ultra-Violet Ray Source

So far we have only comparative tests but no definite relations. We speak of Diamine Sky Blue FF as being fugitive and of Solamine Blue FF as being fast

to light, but who can say whether the latter will stand fifty times the exposure of the former or only fifteen times as much?

Several years ago I hoped that I had a solution for this problem in the quartz mercury vapor lamp, and after the first experiments many new types of lamps were developed. Shortly afterward a series of tests were run at the Bureau of Standards which showed that the output of ultra-violet rays slowly but steadily diminished, making the source of light as uncertain as sunlight itself.

Chemical Reactions Produced by Ultra-Violet Rays

I also found that ultra-violet ray exposure caused the effect of an alkaline reduction on the dyestuffs. Naphthol Yellow S, which fades rapidly in sunlight, only becomes redder and duller under the ultra-violet rays, and Indanthrene Yellow, which stands sunlight exceptionally well, becomes green under the lamp.

The exposure under the ultra-violet rays is always dry and hot, while weather exposure allows the re-absorption of moisture which, the next day, is partly converted into hydrogen peroxide. The sun's rays do contain many ultra-violet rays, but the assortment is different from those emanating from the quartz mercury vapor tube, or from the intensified arc. These conditions, it would appear, limit the use of the lamps to comparative testing of similar products, subject to all the other conditions enumerated above.

Further Obstacles to Quantitative Testing by Ultra-Violet Light

It has been suggested that we measure the intensity of the light while the exposure is being made. The decomposition of ferrous oxalate solution or ammonium succinate in the presence of uranium salts, and the measurement of the liberated gas, seemed practical, but in both cases I found that the fading of the samples took place before enough gas could be collected to be capable of measurement by ordinary laboratory appliances.

A writer recently suggested saturating filter paper with a definite strength of eosine solution, and drying. Pieces of the paper were to be exposed with the samples and as soon as one piece of the eosine paper was faded out to a white a new one was exposed. The total exposure was measured by the number of eosine units required. All dyes do not fade out to the white cloth, however. How, then, are we to judge when the fading has reached its maximum?

A Suggestion

I have but one suggestion along the line of quantitative exposure, but at present have no opportunity of developing it. We will require a long surface exposed to the sun and a mechanical device, run by clockwork, to slowly draw a tape, dyed with the color being tested, from a concealed spool so that while the end gets the full length of exposure, a new part is being constantly fed out. This device would have to be stopped when the sun was not shining. When the test of several colors, simultaneously, was completed, the strips would show a progressive fading that could be compared by measuring the distance from the last spot exposed to the spot where fading was complete The ratio between fast and fugitive colors would be referred to in inches or centimeters. The mechanism might be reversed and the cloth strips remain fixed but covered by a screen that slowly retreated and gradually left more of the samples exposed. For very fast dyes a centimeter a day would be speedy enough, but for very fugitive ones it would be nearer to a meter a day.

Additional Factors

Whatever methods may be used, it should be borne in mind that exposure under glass is very different from the weather test. Ultra-violet rays in sunlight do not pass through the thinnest glass, but there are some light rays that pass through glass and are capable of refraction and reflection, and still cause chemical changes; otherwise photography would not be possible. The weather test is, of course, much more severe, and is likely to be disguised by dirt and soot, which must be removed before comparison is made.

It is earnestly hoped that this very important feature of dyestuff testing will soon receive some practical aid from those most interested in it. The public, when it talks about fast dyes, generally means light-fast. We know they do not require the best dyes made for some of the less important materials, but they do look for what the pre-war sample cards often called "sufficient fastness." Before we can act really intelligently in such a matter we must put ourselves in a position to get more definite information regarding the dyes we are using or selling.

Of course, there are certain well-known dyes whose fastness has been established by actual use—of these we are sure; but when the temptation is offered to use something "just as good," then the remarks given above have a greater significance.

THE FIXING OF IRON MORDANTS ON SILK

In dyeing silk black, the fixation of the nitrate of iron is effected generally by means of warm solutions of soap applied after the silk has been given many passages through the iron solution. The duration of the treatment with soap extends to 2 to 3½ hours, according to circumstances. An appreciable economy in time, labor and material has been realized since the introduction of the froth method of soaping. A reduction in the consumption of soap may be obtained by suspending in the soap liquor small sacks containing silk worm chrysalides or silk wastes containing chrysalides, or by adding the oily liquor obtained after boiling these in water.

Example: In the upper part of a wooden or iron vessel about 7 meters long is arranged a series of about 30 hooks on which are suspended the hanks of silk which have been treated in the nitrate of iron solution. At the base of the dyeing vessel is arranged a serpentine pipe for heating purposes. The hanks reach down to within 60 cm. of the bottom of the vessel. An amount of water sufficient to reach a height of about 25 to 30 cm. (about 5,000 liters) is run into the vessel. A mixture is made of 5 kilo. soap and 25 kilo. silk worm chrysalides. The liquor is brought to the boil to produce the froth which rises to the top of the vessel and completely envelops the silk. This treatment is continued for about one hour. The same liquor may be re-used for at least ten successive lots, freshening after each lot with a little soap and more water to maintain the original level, without, however, adding any further quantity of chrysalides. As the cost of the chrysalides is about half that of the soap, the advantage is obvious. The proportion between the crysalides and the soap may of course be varied, to the extent in some instances of using no soap at all.

Review of Recent Literature

The Popular Chemical Dictionary. C. T. Gingzett, F.I.C., F.C.S. 547 pages; 5½x8¼; illustrated; cloth; $4.50. New York, D. Van Nostrand Company.

The author, one of the founders of the Institute of Chemistry, and past vice-president of the Society of Public Analysts, has provided a handbook of chemical information, accurate in detail and comprehensive in character dealing in an up-to-date way with chemistry as a science, modern theories, manufacturing processes, chemical and natural products including acids, alkaloids, alkalies, alloys, balsams, coal, dyes, essential oils, explosives, fats, fertilizers, foods, glasses, gums, inks, lubricants, metals, oils, ores, paints, perfumes, petroleum, refractories, rubber, resins, sewage, silk, sugars, tanning materials, tar products, varnishes, vitamines, waxes, etc.

There are sections dealing also with the subjects of heat, light, electricity, magnetism, the constitution of matter, atomic structure, the electron theory, radio-activity, catalysis, colloids, enzymes, etc., in compendious critical style, and the various other ramifications of chemistry, such as plant and animal life.

Textile Mathematics, Part 2. Thomas Woodhouse; 123 pages, 4¾x7¼, illustrated; by Thomas Woodhouse and Alexander Brand. Blackie & Son, Glasgow.

The second part of this work carries the student through more advanced stages of mathematics for textile work, the contents being arranged under the following heads: Ratio, proportion and variation; averages; percentages; loss and regain; mixtures, proportions and costs; indices, use of logarithms; trigonometrical ratios; yarn counts; exercises; useful data; logarithm tables. The volume is a very useful handbook for textile mill men, including not only those who are making their first study of the subject, but also those who have taken a course in arithmetic, algebra and geometry. Without constant practice, mathematical calculations, the knowledge gained in the class room quickly fades from the memory, and in such cases this little book will prove to be a friend indeed when the textile mill man finds it necessary to use his rusty mental equipment.

The Jute Industry. T. Woodhouse and P. Kilgour. London; Sir Isaac Pitman & Sons, Ltd. 3s. net.

This is one of "Pitman's Common Commodities and Industries" series, and treats on the whole of the jute industry, from the growing of the seed to the finished cloth. It will be understood that in dealing with jute cultivation, retting, assorting, and baling jute fiber, bale opening, batching, carding, drawing frames, roving frames, spinning, twisting, reeling, winding, warping, beaming, dressing, tying-in, drawing-in, weaving, and finishing, in the compass of 130 pages, the treatment is necessarily brief, but the explanations are lucid and concise without being too technical. The value of the work is increased by the inclusion of a large number of illustrations, and these, together with the text, enable anyone with no previous knowledge of the subject to follow the operations intelligently and become informed of the general routine of jute manufacture. The book will serve as a useful introduction, but those who are in or desire to enter the industry will soon want something more detailed.

The Cotton Industry in France. R. B. Forrester, M.A. Manchester. The University Press. 10s. 6 d. net.

This is a report presented to the electors of the Gartside scholarships, and the volume will form a companion with the descriptions of the cotton industry in America, Germany, and Switzerland which have been written by other Gartside scholars. The material for the present report was collected by the author during visits to France in 1910, 1911, and 1912, and supplemented by later inquiries. The object of the author has been to give a comprehensive survey of the conditions which prevailed in the cotton industry of France, to point out the characteristic features of recent development, and in certain respects to contrast its position with that of the industry in other countries. The author deals with the growth, magnitude, and geographical distribution of the cotton industry in France. He touches briefly on the related industries of dyeing, bleaching, finishing, and printing, and refers to the numerous specialized branches of manufacture, such as ribbons, lace, embroidery, etc. A lengthy chapter treats on the working conditions of the operatives and industrial organization. Later chapters deal with commercial organization and foreign trade;

employers' associations and industrial policy; labor conditions, wages, and trade unionism; schemes of social welfare, social legislation, and the standard of living, with details of retail prices. The book is well written, and gives much useful information about the cotton industry in France that should be specially valuable to those who desire to become acquainted with the conditions prevailing in other countries.

Textile Machine Drawing. Thomas Woodhouse and Alexander Brand; 124 pages 4½x7; illustrated. London, Blackie & Son.

The value of a knowledge of machine drawing to students of textile processes has led Messrs. Woodhouse and Brand to prepare this handbook, which treats the subject of textile machine drawing under the following heads: Instruments; Preliminary Exercises; Construction of Geometrical Figures; Orthographic Projection; Bolts, Screws, Rivets and Keys; Sketching and Drawing of Details; Drawing to Scale; Small Assemblies.

Traite de Tissage au Jacquard. D. de Pratt, Ch. Beranger, Paris, France.

This is an interesting and comprehensive work in French covering the development and technology of jacquard weaving. It is preceded by a historical account concerning the invention of the jacquard loom and follows with a detailed discussion of the following topics: Various Mechanisms; Classification of Looms; Accessories; Make-up and Execution of Design; Putting on Cards; Interweaving, Binding and Tying of the Cards; Manufacture of Fabrics Made on the Jacquard Mechanism to Various Branches of the Textile Industry; Miscellaneous Data Concerning the Jacquard Loom.

The author, a civil engineer, was formerly director of a spinning and weaving works and is now chief editor of "L'Avenir Textile"

D. Van Nostrand, New York, announce in press "Principles and Practices of Fur Dyeing," by William E. Austin, consulting chemist. This work will be illustrated; 6x9; cloth; about 200 pages, and will be a practical manual as well as a complete treatise on the subject of fur dressing and dyeing introduced by a chapter on the differences in furs of the various animals, the effects of climate, age and season; the durability, relative weights, and the valuation of furs, and a description of the important furs. The contents include: Furs and Their Characteristics; Structure of Fur; *Fur Dressing:* Introductory and Historical, Preliminary Operations, Tanning Methods, Drying and Finishing. Water in Fur Dressing and Dyeing; *Fur Dyeing:* Introductory and Historical, General Methods, Killing the Furs, Mordants, Mineral Colors Used on Furs, Fur Dyeing and Vegetable Dyes, Aniline Black, Oxidation Colors, with Coal Tar Dyes. Bleaching of Furs; Bibliography.

INQUIRY DEPARTMENT

All classes of chemical work or advice relating to artificial colors, natural dyestuffs, dyewoods, raw materials, extracts, intermediates, crudes, or dyeing chemicals and accessories in general, will be carried out for readers and subscribers of the AMERICAN DYESTUFF REPORTER by this department.

Inquiries of a minor character will be answered on this page, while major matters involving personal investigation, analyses, perfected processes and working formulas, will, if desired, be treated confidentially through the mails. In answering inquiries which, by their nature, require reference to the products, processes or apparatus of some particular manufacturer we aim to be absolutely impartial. We refer the inquiries to specialists whom we believe to be best qualified to answer them intelligently, and must disclaim responsibility if their reports show unintentional bias. All questions, materials for analysis or letters leading to the opening of negotiations for special work will receive prompt attention if addressed to Inquiry Department, American Dyestuff Reporter, Woolworth Building, New York City.

A. T. C.—*Question:* How are copying printing inks made? I do not mean the kind used for rubber stamps but the thick, pasty variety used by regular printers.

Answer: Copying printer's inks are made by dissolving basic dyes in hot glycerine until a saturated solution results. They sometimes have added to them tannic acid and phenol to prevent recrystallization and when cool form thick pastes which can be used on the press in the usual way. Some varieties are mixed with the regular oil inks. While the two kinds are not easily mixed, the viscosity of the pastes prevents separation.

M. F.—*Question:* What class of dyes is most suitable for dyeing feathers?

Answer: Practically all the basic and acid dyes are used for feather dyeing but, of course, are not to be used together. Feathers should be well scoured with soap and warm water before dyeing. Otherwise they will show many bare spots. The basic dyes are applied at not over 120 deg. Fahr. in a bath that is nearly neutral. Some of the acid dyes may be applied at a low temperature and require very little acid, but those that exhaust slowly on wool require more acid and a full boil. It is better for the feathers if they can be dyed at a lower temperature and there should be no great difficulty in getting a line of colors to work under these conditions.

J.G.K.—*Question:* Which dyes are used for coloring coated paper and how are they applied?

Answer: The dyes are not applied directly to the paper but color only the coating material. The coating is composed of well-washed china clay suspended in water with sufficient binding material to hold it on the paper. The binder may be starch, glue, casein, etc. The basic dyes are generally used when the coating is being colored direct, although sometimes color lakes, made from acid dyes, as well as chemical and mineral pigments, are added to the mass. The mills making coated paper generally buy their paper in rolls and run it through the coating

machine which applies the coating mass to one side of the sheet, dries it and then calenders it with more or less pressure, according to the gloss desired. The gloss is also regulated by the nature of the binder, casein being now generally used for the highest gloss and starch for dull finish.

R.F.—*Question:* I have to dye a large quantity of wool waste a deep brown fast to fulling. It already has a variety of colors and I am not sure they are all fast. Should I strip it first or will the fast dye on top make it sufficiently fast?

Answer: In all cases like this the safest procedure is to run the stock one hour at a boil with 3 per cent bichromate and 2 per cent sulphuric acid. This will strip some of the colors and fasten others. Then before dyeing reduce the free chromic acid by boiling one-half hour with 2 per cent oxalic acid. Wash well and dye with chrome mordant colors, taking care the raise in temperature is not too rapid so as to get the best leveling and fixation of dye, which is essential to perfect fastness.

R.K.M.—*Question:* In your issue of January 16, 1922, there was an article, *re* Acetyl Silk. Will you kindly let us know who is maker of this silk, and also the address?

Answer: You will note that this article was reprinted from the "Journal of the Society of Dyers and Colourists" and was, of course, of British origin. The silk in question is manufactured by the British Cellulose & Chemical Manufacturing Company, of Derby, England, under patents controlled by them. This firm, however, states that inquiries may be made of the American Cellulose Company, 681 Fifth Avenue, New York.

A new shade, on the order of a golden yellow, has been introduced under the name of "Dent de Lion" by H. R. Mallison & Co., Inc. It was brought out during February.

The Alpha Silk Company, 49 State Street, Paterson, N. J., will expend approximately $50,000 to erect a new addition to its plant to be used for a dyehouse.

The Irving Worsted Company, Chester, Pa., will expend approximately $50,000 to erect and equip an addition to its plant. Additional drawing and spinning equipment will be installed. The addition will comprise a main mill one story high and an adjoining office building two stories.

Broad-silk manufacturers are expecting crepes to predominate in the demand this spring, with satins and taffetas coming in for a fair share of favor. As to colors, they believe there will be a departure from blacks and whites and a reveling in bright hues. Yellows will be particularly favored, and bright, crisp greens.

Foreign Trade Opportunities

Reserved information may be obtained from the U. S. Bureau of Foreign and Domestic Commerce and its district and co-operative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given Correspondence may be in English unless otherwise stated. Symbols: *Reported by American consular officers; †Reported by commercial attaches and trade commissioners; ‡Direct inquiries received by the Bureau.

978.*A commercial agent in France desires to act as representative with financial responsibilities for the sale of *cotton* and *woolen goods.* Quotations should be given c. i. f. French port. References.

979.*—The agency is desired by a salesman in Chile of American firms for the sale of *cotton textiles, underwear,* and other articles of men's furnishings. Quotations should be given c. i. f. Chilean port or f. o. b. New York. References.

980.†—A mercantile firm in Japan desires to purchase yarns, such as *woolen, worsted, mousseline,* and *hosiery yarns, wool tops, woolen textiles,* etc. Quotations should be given c. i. f. Japanese port.

912.‡—A manufacturing firm in France desires to obtain *cotton* for the making of thread and cloth. Correspondence should be in French or German. References.

891.‡—A request has been received from a maker of military uniforms in Mexico for prices and samples of *gabardines* and *khakies,* direct from manufacturers. Quotations should be given f. o. b. factory. No reference.

1040*—An American consul in Palestine reports that a firm of commission agents desires to secure an agency for the sale of general merchandise, including ironware, *cotton textiles, hosiery,* metal bedsteads (four-post, French, and combination styles), alcohol, 95 per cent, in galvanized iron drums, with hoops, and similar goods suitable for trade in the Near East. Quotations should be given c. i. f. Jaffa or Haifa. Terms, 20 per cent with order and balance against documents. References.

1044.‡—A commercial representative in Norway wishes to be placed in touch with manufacturers and producers of sugar, flour, and every kind of foodstuffs, *all textile articles,* boots and shoes, leather, etc. No reference given.

1056.*—A firm of commercial agents in Belgium desires to secure an agency on commission for the sale of *silk hosiery, knit goods,* and *mercerie fabrics.* Quotations are requested c. i. f. Belgian port. Correspondence should be in French. References.

848.‡—A business man in Persia, who is soon to organize a commercial house for the importation of goods, wishes to receive catalogues and samples, with a view to selling *textiles, clothing of all kinds* for men, women, and children; paper goods; electrical apparatus; and pharmaceutical products. Quotations should be given c. i. f. Basrah, Bouchir, and Mohammerah, and also parcel-post rates. No references given.

921.*—There is a market in Czecho-Slovakia for *raw wool and cotton.* Quotations should be given c. i. f. German, French, or Holland ports. References.

914.*—Inquiries have been received from Spain for agencies for the sale of lubricating oil, lumber and structural material, naval stores of all kinds, *cotton,* wheat flour and other breadstuffs, corn, brown and refined sugar, groceries, and agricultural machinery. Quotations should be given c. i. f. Corunna and Vigo. References.

903.†—The purchase is desired by a business man in South Africa of equipment for a tailoring shop for the repair of clothing and hosiery, including *knitting, darning,* and other *machines;* and also supplies such as *cotton and silk thread,* and *yarns.* Catalogues and price lists are requested. Cash to be paid.

904.‡—An inquiry has been received from a mercantile house in Jamaica for the purchase of millinery supplies, trimmed and untrimmed hats, notions, ribbons, *laces, thread, hosiery,* novelties, *underwear, waists,* corsets, *organdie,* perfumes, toilet requisites, etc. Catalogues are requested and salable samples will be paid for. Reference

1064.*—A firm of importers in Egypt desires to secure the representation of manufacturers for the sale of wire nails, iron and steel goods, light leather, footwear, *gray and fancy cotton goods,* flour and semolina, preserved foods, and tin plate. Quotations should be given c. i. f. Alexandria. Terms: Cash against documents in local bank. References.

946.*—An agency on a commission basis is desired by a mercantile company in Australia for the sale of *cotton piece goods, hosiery,* and *underwear.* Quotations should be given c. i. f. port of Victoria. References.

900.*—An inquiry has been received from a merchant in Greece for the purchase of *women's fancy dress goods, silk, woolen and cotton goods,* and *woolen* and *cotton blankets* for bedcovers. Quotations should be given c. i. f. Grecian port. Correspondence should be in French or Greek. References.

953.‡—A commercial agent in the British West Indies desires to secure the representation of firms for the sale on a commission basis of *cotton goods,* or any other goods which will find a market in those islands. References.

859.‡—A request has been received from a firm of importers and representatives in Chile that it be placed in communication with manufacturers of *fancy cotton flannelettes.* References.

860.*—A dealer in housefurnishings goods in Austria desires to purchase general merchandise, such as *textiles,* rubber office equipment, sewing machines, shoes, and specialties. An agency is also desired. Quotations should be given c. i. f. German ports. References.

1072.*—A commercial agent in Argentina desires to secure the representation of firms for the sale of *textiles,* especially *silks* and *cotton goods.* Correspondence should be in Spanish. Reference.

1079.*—There is a market in Czecho-Slovakia for *wool and cotton goods* and firms should forward quotations c. i. f. German, French, or Holland ports. References.

1081.*—A trading company in Canada having large heated and unheated warehouse facilities for the storage and handling of all classes of merchandise, including machinery, desires to communicate with firms doing business in western Canada in the sale of machinery, *cotton goods,* veilings and dress trimmings, California fresh fruits and nuts, and dried fruits. Quotations should be given c. i. f. destination. References.

1085.*—A commercial agent in England desires to secure the representation of firms for the sale of *sewing cotton, threads,* etc., on reels and cops, for the use of wholesale clothiers, boot manufacturers, corset manufacturers, and others. Reference.

WANTED

Wanted: By a concern in the East manufacturing line of high-grade dyestuffs for the woolen trade, experienced, high-calibered man to build up sales department. Address Box No. 182, American Dyestuff Reporter, 4109 Woolworth Building, New York City.

Wanted: Second-hand Tom Tom. Must be in good condition. Address Box No. 183, American Dyestuff Reporter, 4109 Woolworth Building, New York City.

Recent Patents

Dyeing Machine

(1,407,265; February 21, 1922)

WILLIAM J. GOING, Schenectady, N. Y. (assignor to the Klauder-Weldon Dyeing Machine Company, Jenkintown, Pa.).

This relates to yarn treating machines, and with respect to its more specific features, to yarn dyeing apparatus, and this application is a division of application filed May 8, 1916, Serial Number 96,099.

One of the objects of the invention is the provision of a simple and practical yarn dyeing apparatus in which the yarn is continuously immersed in the dye liquid during the dyeing operation.

Another object of the invention is the provision, in apparatus of the character referred to, of rotary yarn sticks, and means coupled therewith, for preventing injury to the machine should the rotation of the sticks be abnormally resisted.

The accompanying drawing, Fig. 1, is a side elevation of an embodiment of the invention, showing the vat and operating devices, while Fig. 2 is a plan of Fig. 1.

The numeral 1 indicates a vat adapted to contain the treating liquid, as dye liquor for dyeing the field of yarn immersed in the vat. A cover for the vat is employed, and in the present embodiment this cover comprises two pairs of foldable cover sections 2 and 3 hinged to each

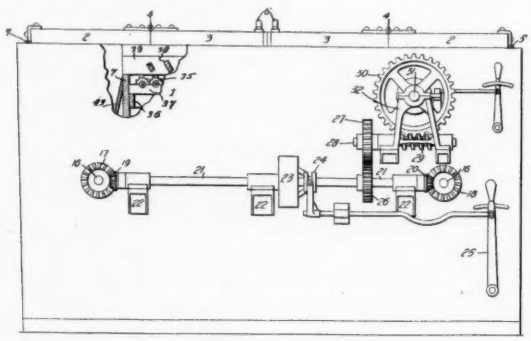


FIG. 1

other at 4, the sections 2 being hinged to the ends of the vat at 5 and the sections 3 being provided with a handle or other manipulating device 6. By this construction the section 3 may turn on its hinge 4 to partially uncover the vat, or both sections may turn on hinge 5 to wholly uncover the vat. One pair of the sections fold to the left, and the other pair to the right.

Within the vat are transverse partitions 7 and 8 spaced from both the top and bottom of the vat and providing chambers 9 and 10 at opposite sides of the vat, in each of which chambers are located means adapted to establish currents of the treating liquid. In the present embodiment each current-establishing means comprises rotary propellers having flat vanes 11 extending across the vat near the center of its depth and journaled in longitudinally disposed partitions 12 and 13 forming the sides of the chambers 9 and 10. Each propeller comprises a plurality of propelling wheels provided with the flat vanes 11 referred to and intermeshing in a manner similar to that of a rotary pump, the axis of each pair of wheels being provided with intermeshing gears 14 and 15, so that when one is rotated the other will rotate therewith. The gears 14 are connected to rotate with short

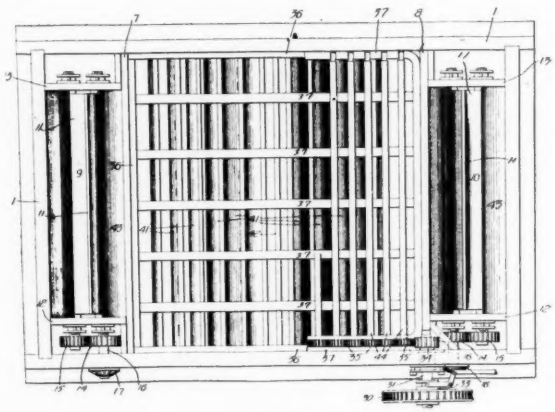


FIG. 2

shafts 16 suitably journaled in a side wall of the vat and provided with bevel gears 17 and 18 meshing with bevel gears 19 and 20 on the longitudinally disposed rotary shaft 21 journaled in brackets 22 on the side of the vat. 23 indicates a belt pulley rotatably mounted on the shaft 21 and adapted to be clutched to said shaft for driving the same by any suitable form of clutch having a clutch collar 24, splined to shaft 21, and which latter collar may be manipulated by a shift lever 25. The numeral 26 indicates a gear wheel rotating with the shaft 21 and meshing with a gear wheel 27 carried by a worm shaft 28, the latter being provided with a worm 29 engaging a worm wheel 30 mounted to rotate on a short shaft 31 supported in a bracket 32 on the side of the vat. 33 indicates a clutch element splined to the shaft 31 and having a clutch face adapted to co-operate with a clutch face on the worm wheel 30, so that when the clutch elements of the worm wheel 30 and the collar 33 are in engagement, the shaft 31 will be rotated.

Within the vat, on the shaft 31, is a gear wheel 34 adapted to mesh with the end one of a series of gear wheels 33, the rotation of the wheels 35 being adapted to effect rotation of certain yarn sticks. The series of yarn sticks is adapted to support a plurality, or field of hanks of yarn, within the vat during the dyeing operation. In the present embodiment a plurality of the sticks is supported in the upper portion of the vat on shoulders 36 extending from the partitions 7 and 8, the plurality of sticks being connected for support to a frame 37 which may be vertically moved into and out of the vat when the cover is open. Above the frame 37 is supported a series

of deflecting plates 38 consisting of inclined cross pieces connected at their opposite ends to longitudinal stringers 39 adapted to removably rest on the tops of the partitions 7 and 8. The purpose of the deflecting plates 38 will be more fully explained hereinafter, it being sufficient to note at this point that when the cover is open and the frame 37 carrying the dye sticks is lifted from the vat, these deflecting plates 38 will be lifted therewith. Furthermore, as the plates 38 merely loosely rest in their position in the vat, they may be removed from the vat independently of the yarn stick supporting frame 37.

A plurality of yarn supporting sticks, 44, is employed in the present embodiment. Each of these sticks is preferably rectangular in cross section and is rotated during the yarn treating operation. To this end one end of the stick enters a squared socket in a rotatable stick support journaled in a bracket carried by the frame 37, the other end of the stick being supported in any suitable manner for rotation in said frame. The gears 35 are provided with a clutch element, these gears being chambered so as to provide a ring having an interior circular clutch overhanging certain other parts.

The axis of each stick is stationarily positioned during the yarn treating operation, the stick nevertheless being capable of rotating on its axis during the yarn treating operation in order to move the hanks of yarn relatively to the respective sticks so that the dye liquor may have access to the portions of the yarn lying against the sticks.

The operation may be briefly described as follows:

The covers are thrown back and the frame 37 carrying the yarn sticks on which the yarn field is supported is lowered into the vat, the frames 37 resting upon the shoulder 36. The frame having the deflecting plates 38 is placed in position opposite the upper face of the yarn field and the cover is closed. The yarn sticks will be slowly rotated so that the parts of the yarn hanks in contact therewith will eventually come in free and unobstructed contact with the dye liquor, and after a proper length of time the operation of dyeing will be completed, whereupon the covers may be thrown back and the frame 37 lifted by any suitable means to carry the hanks of yarn out of the dye liquor, this lifting also carrying the deflecting plates 38 therewith if they have not previously been removed. Should the yarn become entangled, or if for any other reason normal rotative movement of the sticks be resisted, the automatically yieldable power transmitting device, in the present embodiment, the friction clutch connection between the gears 35 and the sticks, will yield, and the gears may continue to rotate under the driving power without further rotative movement of the sticks. The shallow recess co-operating with the tooth of the yoke forms a sufficient frictional connection between the gear 35 and the stick support to cause the support and the stick therein to be effectively rotated during the operation of dyeing, and abnormal resistance to rotation of the stick will cause the tooth to escape from the recess and permit it to remain stationary while the gear 35 continues to rotate under the influence of the power. The dye liquor flows gently upward through the yarn field and has a tendency to uphold the hanks, causing the light of yarn over the sticks to spread somewhat so that the dye liquor may come into contact with more of the yarn closely adjacent the stick than it would if this expanding were absent. This expanding, however, when the hanks of the field are closely associated, may result in entanglement of one hank with another, so as to obstruct rotation of the sticks, in which case the connection between the sticks and the driving means will yield, the sticks thereafter remaining rotatively at rest though the driving means continues to operate.

Fractional Distilling Apparatus

(1,407,380; February 21, 1922)

EMILE ANDRE RAYMOND CHENARD, Cognac, Charente, France

This invention has for its object an apparatus for effecting the fractional distillation of most liquid mixtures, whether continuously or not.

The accompanying drawings show by way of example the preferred form of embodiment of the invention.

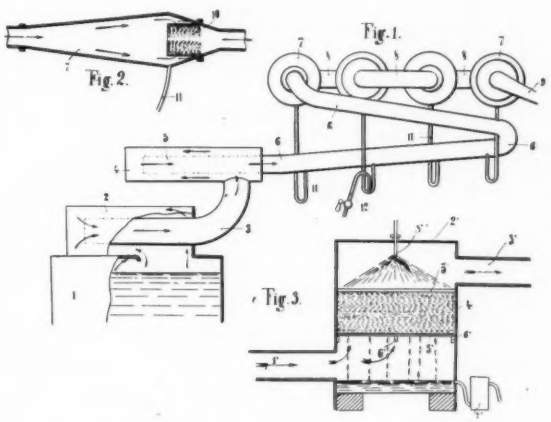


Fig. 1 is a diagrammatic elevation of the complete apparatus.

Fig. 2 is a detail view of one of the units 7 shown in Fig. 1.

Fig. 3 shows the device used for separating tar from the gas obtained from coal, slate, brown coal and peat.

In Fig. 1 the boiler is shown as having the form of a vertical cylinder on the top of which is placed, instead of the usual dome, a chamber 2, the right-hand portion of which communicates with the boiler through an opening formed in the boiler top to receive the vapors flowing out of the boiler and moving upwards into said chamber. On entering the chamber, the vapors travel therethrough from right to left, and enter the open left-hand end of a pipe 3 located centrally of said chamber, through which pipe they flow from left to right, as indicated by the arrows, and finally enter the right-hand end of a second cylindrical chamber 4 disposed above and parallel with chamber 2. The vapors flow through this chamber 4 from right to left, and then enter a centrally arranged pipe 5, through which they flow from left to right. Any number of

units similar to the one just described may be used in accordance with the particular requirements, the whole set constituting an apparatus the purpose of which is hereinafter explained.

The pipe 5 projects beyond the chamber or cylinder 4 and is extended in such a manner as to form a V-shaped conduit 6, the lower branch thereof rising slightly from left to right, while the upper branch has an opposite rise from the right to the left, said conduit conducting the vapors to a series of units 7 such as shown in Fig. 2. Each unit 7 comprises a hollow casing having the form of a pair of cones arranged base to base and the various units are connected together through pipes 8 arranged in staggered relations, the number of units varying in the series in accordance with the particular purpose to be attained. From the last unit of the series the vapors are led through a pipe 9 to the cooling device.

The units 7 shown in longitudinal section in Fig. 2 are given this double cone shape in order to facilitate the spreading out of the current, the vapors being thus permitted to work against the outer pressure throughout the entire zone of increasing cross-sectional area. During this action they undergo internally a progressive cooling which is accompanied by the progressive condensation of the less volatile constituents. Thus is obtained the kinetic and adiabatic separation of the liquid mixture to be distilled, such as a mixture of water and spirit, for instance. This process, which is already described in U. S. Patent No. 1,307,184, granted June 17, 1919, is distinct from the effects obtained in the usual expansion of vapors in thermal engines in so far as it is not connected to an increased volume of the vapors. The volume of the latter, on the contrary, is gradually reduced until they reach the outlet of the apparatus, when they represent in weight and volume only a very small proportion of the original body.

The set of units 7 constitutes therefore a new form of application of the same principle having for its object to intensify the work of the vapors, while reducing the size of the construction, by giving them a greater space for action.

Arranged inside each unit 7 is a cylindrical box 10 provided with large side openings and preferably filled with wire gauze rolled in such a manner as to bring the successive layers of wire gauze very close together, though a packing comprising metal chips, glass balls or porcelain chips may be used for the same purpose. The function of said box is essentially to sift the vapors by providing large screening surfaces, though in the form of a compact construction, upon which the vapors may deposit the liquids resulting from the adiabatic condensation in the front part of each unit, previous to their passing into the next unit. The liquid condensates percolating through the screen boxes are collected in inverted syphon pipes 11 through which they are delivered in the order of their production to the lower branch of the V-shaped conduit 6, where they meet the ascending vapors through said branch and cool them gradually, thus causing fresh condensation to take place, while they are vaporized gradually through their contact with said vapors.

The stream of liquid condensates runs down by gravity through the parts 5, 4, 3, 2 in a direction opposite to that traversed by the vapors, while exchanging gradually its heat with that of said vapors. Hence the function of the aforesaid arrangement is essentially that of a heat exchanger between the vapors flowing upwards from the boiler and the liquids condensed in the various units 7, and this function will be the better accomplished according as the liquids returning to the boiler have, when the latter is reached, a temperature and a composition which are nearer to the temperature and composition of the liquid in the boiler.

One or more of the return pipes 11 may be provided with an ordinary syphon 12 as shown in Fig. 1, which is controlled by a small cock, this arrangement enabling a partial extraction of the condensates together with the impurities which, in distilling devices, tend to become localized during the course of distillation. An automatic draining of these impurities is thus obtained, which is desirable for the success of the process.

There has been mentioned hereinbefore the use of wire gauze arranged in very close layers for catching the liquid particles entrained in the vapors, and the use of this wire gauze has been indicated as being equivalent to that of any inert materials, as a filtering agent. The separating action is due, in reality, mainly to the fact that the particles of liquid already caught become joined together through a capillary action and form extremely thin liquid screens or films which stretch across the wires and check the flow of gas and the liquid particles carried thereby. Thus it appears that the essential function is not effected by the quite insufficient baffling action afforded by the metal itself, but is chiefly due to the fact that the wire gauze, together with the liquid, enables the formation of the film-like network or screens of liquid; and the efficiency of the device depends mainly upon the two following factors, viz.: the mesh of the wire gauze and the viscosity of the liquid. Moreover, each liquid particle should obtain a very high chance of meeting and being caught by an obstruction. Now the films are continually burst by passing gas or vapor and are not rebuilt at once. Hence, in order to obtain a perfect filtration the obstacles must be multiplied by providing a great number of layers of wire gauze. On the other hand, these webs must be very close together so as to facilitate the formation of liquid films either across the wires of the same web or across the wires of two different webs, this being due to the irregular movements of the gas or vapor resulting from impact against the wires.

Finally, it is absolutely necessary that the mesh and sizes of the wires be such as to avoid the undue resistances which would otherwise be produced, if a packing of wire gauze having too small a mesh were to be used with a very viscous liquid. Experiments have shown

that extremely high resistances might thus be produced which would interfere with the circulation of the aeriform fluid and be prejudicial to the results.

The use of wire gauze may have been disclosed previously, but it has not spread—namely, in connection with distillating purposes—on account of the fact that the theory of the apparatus of the kind described was not sufficiently explained and the efficiency of the apparatus proposed was less than that of the ordinary apparatus. By operating on the principles hereinbefore indicated, on the contrary, it is easy to provide separators which will have the greatest efficiency and may be applied generally to all cases where it is useful to separate, from a gas or a vapor, the liquid carried by said vapor or gas in the form of a mist of variable thickness.

Fig. 3 shows the device proposed for separating the tar from gas obtained from coal, slate, brown coal and peat.

The gas is brought by the pipe 1′ to the lower part of a metal box 2′ and leaves by the pipe 3′ after having passed through the separator. The latter consists of sheets of wire gauze 4′ overlying each other and held tightly together by means of two metal plates or frames 5′ provided with wide openings and supported by brackets 6′. The tar stopped by the wire gauze agglomerates and trickles down to the bottom of the box from which it is discharged through 7′.

In the case of lighting gas, the wire gauze packing should be freely besprinkled with fresh tar before starting and the apparatus is then ready for use.

In the case of coke gas which is to be treated at a higher temperature, whereby the tar is materially less viscous, a greater number of sheets of wire gauze of a finer mesh should be used, the operation of the apparatus being facilitated by a device such as 8′, which sprinkles tar on the sheets, thus compensating for the dant of viscosity and securing a perfect separation of the tar and the gas.

Color Identifying Apparatus

(1,408,109; February 28, 1922)

NORMAN MACBETH, New York, N. Y.

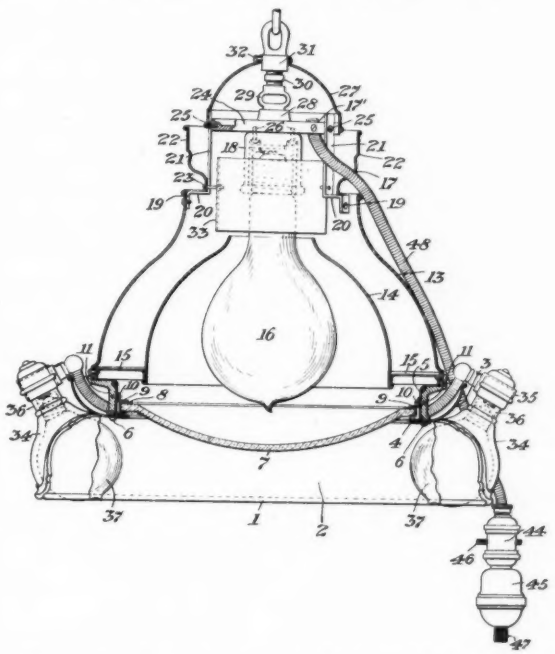
This invention concerns an electric illuminating apparatus primarily intended for matching and identifying colors, such as the colors of colored dress goods and the like, by alternately illuminating the same with a source of ordinary artificial light, such as the light given by an ordinary incandescent lamp, and with a light source, the color of which has been corrected so that it furnishes a light equivalent to daylight. The apparatus is primarily intended to carry out the method of procedure for the indentification of colored objects described in inventor's U. S. Patent 1,239,443 of December 17, 1917.

The object is to provide an apparatus of rather large capacity and which may be permanently attached to the ceiling of a room or enclosure in which colored objects are to be examined alternately under an ordinary artificial light and under light equivalent to daylight. In particular it is adapted to be permanently attached for example to the deck or ceiling of a three-mirror booth such as is used in clothing stores, so that the purchaser of wearing apparel may examine the same alternately under the conditions of artificial light and of daylight, without the necessity of his stepping out of the booth.

Another object is to so construct the apparatus that it is properly ventilated and that the heat generated therein is uniformly distributed and removed.

A further object is to provide means for effectively screening one light source from the other and for preventing light, the color value of which has not been corrected, from escaping outside of the apparatus and thus vitiating the results obtained therewith.

The drawing represents a vertical cross-section of a form of the apparatus suitable for pendant use.



The numeral 1 represents a sheet metal shell, consisting of a lower inwardly-curved portion 2, an upper outwardly-curved portion 3, and a drawn-in middle portion forming a circular ridge. Supported on the said ridge 4 is a cylindrical ring 5 of sheet metal, the lower rim of which is turned inwardly at right angles. Resting on the lower rim of the said cylindrical ring 5 there is a disc 7 of colored glass, chosen with a view of correcting the color value of the light passing therethrough and rendering the same equivalent to daylight. The said disc 7 is provided on its edge with a sheet metal binding 8 and is held in position by angle clips 9 fastened to the inner surface of the cylindrical ring 5 by screws 10. Fastened to the outside of the cylindrical ring 5 are outwardly-projecting lugs 11, to which the rim portion 4 is fastened by screws 6.

At opposite points on the circumference of the above-mentioned lower portion 2 of the shell 1 are cut two openings, covered by reflector casings 34, 34. Each of the said casings is provided with an upper extension 35, 35.

the latter being adapted to receive an incandescent lamp socket of the usual construction 36, 36. Into the sockets 36, 36 there are inserted incandescent lamps 37, 37 of the usual construction, preferably of the refractory filament type.

Upon the above-mentioned lugs 11 there rests a conical shell 13. A reflector 14 is disposed within the said shell 13 and supported from the same by a plurality of inwardly-extending straps 15. Within the reflector 14 there is arranged an incandescent lamp 16, preferably of large candle-power and of the so-called gas-filled type. The lamp 16 is held in a porcelain socket 18 of the usual construction.

At the top of the conical shell 13 and on the inside thereof, there are located a plurality of inwardly-extending straps 19, having a horizontal intermediate portion 20, and an upwardly-extending vertical portion 21. Upon the said horizontal portion 20 there rests an outwardly-curved cylindrical shell 22, fastened thereto by screws 23. The upper end of the vertically-extending portion 21 is fastened to a circular plate 24 by means of screws 25. The above-mentioned porcelain lamp socket 18 is also supported from the under side of the said plate 24 by means of the screws 26.

An inverted cup-shaped top shell 27 fits tightly over the circular plate 24, being supported by the upper end portions 21 of the straps 19. The plate 24 is provided on its upper surface with a boss 28, which has a central threaded opening into which screws a male and female threaded hickey 29. Into the upper threaded portion of the hickey 29 there screws a hollow nipple 30, which is also threaded at its upper end. Onto the latter there is screwed a suspension ring 31, over which the above-mentioned top shell 27 is slipped, whereupon it is fastened to the same by the screw 32.

From the above-mentioned screws 23 there is also supported a cylinder 33 of sheet metal, which is interposed between the neck of the incandescent lamp 16 and the shell portions 13 and 22.

Control of the light is effected by means of closing the main circuit by actuating the two-point switch 44 by means of the push button 46. Operator may thus alternate the incandescent lamp 16, the light of which is corrected so as to furnish light equivalent to daylight, and the ordinary incandescent lamps 37, 37, by operating the three-point switch 45 by means of the push button 47.

Ample space for ventilation is provided, since a large quantity of air can enter through the annular space provided between the upper portion 3 of the bottom shell 1 and the conical shell portion 13. The air thus entering rises in the space between the reflector 14 and the conical shell 13 and partially within the reflector 14. It then passes over the glass disc 7 and around the lamp 16, thus carrying off a considerable amount of the heat generated by the same. The heated air passes out of the top of the apparatus through the annular spaces provided between the shell portions 13 and 22 and the shell portions 22 and 27.

In spite of the large amount of air space thus provided, none of the unfiltered light furnished by the incandescent lamp 16 can escape to the outside of the apparatus, because it is trapped and reflected towards the interior of the apparatus by the cylindrical sheet metal ring 5 mentioned above, the cylindrical sheet metal ring 33 arranged in the upper portion of the apparatus, and the lower edges of the shell portions 27 and 22.

The interior of the apparatus is easily accessible, because the upper portion thereof can be thrown back by means of a hinge after the lug screw which holds the two sections of the apparatus together, has been loosened.

NEWPORT INTRODUCES NEW VAT COLOR

Product Under Name of Anthrene Jade Green Has Same Characteristics as Other Anthrene Colors, and Produces Very Fast Brilliant Bluish Green

In placing on the market this vat dye of the anthraquinone series, the Newport Chemical Works, Inc., have added a new and valuable product to their range of vat dyes.

Newport Anthrene Jade Green is marketed as a 20 per cent paste and produces bright green shades of a bluish cast, which are extremely fast to light, washing and chlorine. Combined with Newport Anthrene Yellow G Paste, a range of brightest greens may be obtained, which were heretofore difficult to produce with fast colors.

The color has the distinct advantage over the other Anthrene greens of retaining its full green shade under the action of chloride of lime.

Newport Anthrene Jade Green is also adapted to the dyeing of silk yarns, yielding greens of excellent fastness to washing and light. The product should create considerable interest among the manufacturers of ginghams and shirtings, and is a significant achievement in the production of new fast colors in this country.

DU PONT ANNOUNCES NAPHTHANIL SCARLET G BASE

The Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., announces placing on the market Du Pont Naphthanil Scarlet G Base. This product is a valuable addition to the company's line of products which are used coupled with Du Pont Naphthanil AS for the production of shades of extreme fastness on cotton material.

The addition of Du Pont Naphthanil Scarlet G Base permits the production of delicate and attractive shades of pink, from a yellowish to a bluish shade.

DU PONT ANNOUNCES PONTACYL LIGHT GREEN SF YELLOWISH

The Dyestuffs Sales Department, E. I. du Pont de Nemours & Co., announces placing on the market Pontacyl Light Green SF Yellowish.

This yellowish shade of Acid Green is well known as a pre-war product, somewhat yellower than the company's Pontacyl Green B previously offered, and having

the advantage over the former product of dyeing exceedingly level.

G. H. DAVIS AND W. E. SCHOENFELD ESTABLISH ALPHA DYESTUFF CO.

Announcement has been made by George H. Davis and William E. Schoenfeld, the latter formerly of the Newport Chemical Works, Inc., to the effect that they have established their office and fully equipped laboratory under the firm name, Alpha Dyestuff Company, at 155 Broadway, Brooklyn, N. Y. Both enjoy a wide acquaintanceship in the trade, having been connected with Kalle & Co. prior to the war. They will conduct a general dealer business and will do testing for consumers They announce themselves ready to furnish best quality products and prompt service. The firm's telephones are Stagg, 7143 and 7144.

JANUARY DYE IMPORTS FIGURES FROM COMMERCE BUREAU

The imports of dyes during January according to the Bureau of Foreign and Domestic Commerce were as follows:

	Alizarin and Alizarine Dyes		Colors or Dyes Not Elsewhere Specified	
Countries	Pounds	Dollars	Pounds	Dollars
Belgium	529	1,222	627	397
Czecho-Slovakia	...	...	600	1,273
France	60	172	661	275
Germany	19,326	50,940	245,345	182,347
Italy	238	418	8,468	7,911
Netherlands	172	565	6,039	8,957
Switzerland	...	...	33,430	78,637
England	2,096	1,896	17,931	10,469
Quebec and Ontario	...	...	160	255
Totals	22,421	55,213	313,261	290,521

	Indigo Synthetic		Extracts and Decoctions for Dyeing	
Countries	Pounds	Dollars	Pounds	Dollars
France	5,320	13,920	10,590	3,501
Germany	...	...	556	1,432
Switzerland	19,451	18,008	500	523
England	...	...	26,479	1,932
Scotland	...	...	27,379	1,730
Jamaica	...	...	26,214	6,362
Dominican Republic	...	...	35,648	2,707
Haiti	...	...	281,787	16,335
Straits Settlements	...	...	2,240	109
Japan	...	...	5,364	199
Totals	24,775	31,928	416,757	34,830

The Textiloseund Kunstweberei A-G., an artistic weaving establishment in Adorf, Germany, is raising its capital by the issuance of 8,500,000 marks in common stock and 500,000 marks in 6 per cent preferred shares with tenfold vote.

NEW CAMPBELL BULLETIN DESCRIBES "NEW FAST ACID GREEN"

A new bulletin of John Campbell & Co., 75 Hudson Street, New York, describes the company's New Fast Acid Green, also known as Naphthol Green, which is very fast to light and has enjoyed considerable popularity in the woolen trades.

It is much used as a piece dye for worsteds with silk decorations, as it leaves the latter fiber unstained when dyed by the top chrome method. It is also used as a slub dye applied on a chrome bottom. Its resistance to fulling is satisfactory.

New Fast Acid Green is also fast to alkalies, stoving, carbonizing and light steaming. Silk and cotton threads are both slightly stained when dyed straight "acid," but are left clear when top chromed. This product is useful for dyeing burlaps for wall covering on account of its resistance to light, and is also a serviceable product for the wool and fur felt hat trades because of its ready penetration.

NATIONAL BULLETIN NO. 20 DESCRIBES SULPHUR BLACK BG CONC.

Due to error, the account in the last issue of The REPORTER of new bulletins of the National Aniline & Chemical Company, Bulletin No. 20, which describes National Sulphur Black BG Extra Conc., was omitted. This is another bulletin of the series intended for filing in National's loose-leaf binder, and was issued in conjunction with bulletins describing National Wool Green S National Sulphur Black R, and National Quinoline Yellow.

National Sulphur Black BG Extra Conc. possesses the greenest cast of any of the company's colors of this type. It dissolves readily with half the amount of Sodium Sulphide Conc., which makes it adaptable for the dyeing of raw stock, yarns and piece goods in all types of machines. Its level dyeing quality is rated by the company as excellent, and it exhausts well with common salt.

DETERMINED TO KEEP OUT GERMAN BROMIDE, SAYS DOW CO. REPRESENTATIVE

"We'll see every pound of American bromide in Hades before we'll let Germany sell bromide in America, said Dr. W. J. Hale, of the Dow Chemical Company, Midland, Mich. Dr. Hale recently addressed the Rochester, N. Y., Section of the American Chemical Society on "Our Chemical Awakening."

Dr. Hale declared that his company is selling at 12 cents a pound bromide that is costing 23½ cents a pound to produce, and is doing this to prevent the Germans from dumping on the American market thousands of tons of the product now in Eastern warehouses. He said that there is to-day $200,000,000 worth of foreign goods in bond in New York.

Dr. Hale predicted that unless American chemists turn out better products than even her foreign competitors at prices to meet theirs the chemical industries of this country will be destroyed. He argued for tariff protection for American chemicals.

NOTES OF THE TRADE

With a capital of $1,000,000, the New York Coal-Tar Products & Chemical Company has been incorporated under the laws of New York State. Incorporators are the Corporation Guarantee & Trust Company, Land Title Building, Philadelphia, Pa.

"Colors Fast or Fading" is the title of a bulletin just issued by the Atlas Electric Devices Company, of Chicago. It tells of the value of the Fadeometer to industries making or using colored materials.

The Grant Chemical Company, Newark, N. J., has been incorporated with a capital of $25,000. The incorporators are Nathan Gelb, William M. and Lovett A. Grant, 790 Broad Street, Newark.

The Anke Knitting Mill, of Hawley, Pa., will erect an addition to their plant to increase production. They recently erected a new mill in White Mills, Pa., which is now in full operation. The products are men's, women's and children's sweater coats, golf stockings, bathing suits, caps and leggings, for the manufacture of which additional new machinery will be installed in the Hawley mill.

The Jersey Silk Dyeing & Finishing Company, Paterson, N. J., has taken over the Beltramo Piece Dyeing & Finishing Company, under the active management of Dr. John H. Haerry as vice-president and general manager. Their specialties are jersey cloth, satins, crepes, artificial silk and mixed goods.

The Robertson Chemical Company, Norfolk, Va., is planning for the rebuilding of the portion of its plant, recently destroyed by fire, with loss estimated at about $40,000. Headquarters are in the Board of Trade Building. Walter H. Robertson is president.

The Thomas Textile Company, New York, N. Y., has been incorporated, with a capital of $1,000, for the manufacture of textiles.

The Lima Woolen Mills, Lima, Ohio, has been incorporated, with a capital of $200,000, for the manufacture of all-wool blankets. J. A. and J. N. Claypoole are the managers of the new concern. An initial equipment of thirty looms will be installed when the new mill construction is completed.

The Republic Chemical Company, Manitowoc, Wis., is planning for the installation of machinery in a new local plant. E. H. Koehneke is president.

Artificial silk is being used in such large and increasing volume in the manufacture of broad silks and ribbons that from now on it will have to be reckoned with as a very important element in the fabrication of natural silk goods. It is believed that the statistical position of artificial silk to-day is so important that the Silk Association of America may call attention to its position in the industry in its fiftieth annual report.

A. W. Van Ness and C. M. Guy, of New York City, and John G. Snyder, of Philmont, N. Y., are among the incorporators of the Columbine Garment Company, incorporated with a capital of $25,000 for the manufacture of hosiery and underwear in Philmont.

The Sylvade Silk Mills, 126 Market Street, Paterson, N. J., have been incorporated with a capital of $125,000. The incorporators are Charles Turndorf, Sophie Charney and Cora De Mol.

The Southern Dyestuffs Company, Nitro, W. Va., recently organized, will soon commence the installation of considerable equipment in five of the buildings of the former Government works, recently acquired. The complete plant production will total 160 intermediates for dyestuffs. Employment will be given to about 200 operatives.

The Industrial Dyestuff Company, East Providence, R. I., has been incorporated, with a capital of $50,000, to manufacture dyestuffs, chemicals, etc. The incorporators are Herbert L. Tobey, Simon Norman and John H. Caton, Jr., 96 Arnold Avenue, Edgewood, R. I.

The San Silk Company is the name of a new cooperative concern recently organized by nineteen Polish-American citizens at Paterson, N. J. The capitalization is $100,000 and the four principal shareholders are Charles Guerney, 59 East Main Street, S. Sasowskim, A. Walzak and A. Andrejeswki.

The Marble Mills, Inc., of Evanston, Ill., have incorporated, with a capital of $50,000, for the manufacture of woolen piece goods, at the northeast corner of Benson Avenue and University Place. The incorporators are: Edward M. Marble, of Winnetka; Eugene C. Marble, also of Winnetka, and Sol. H. Shoninger, of Chicago.

The Silk Association of America, the National Association of Woolen and Worsted Manufacturers and the National Association of Finishers of Cotton Fabrics have, by resolution, commended the work of the Textile Alliance, and favor the continuance of its service through some non-profit retaining organization of the consuming trades. George A. Post, a vice-president of the Silk Association, represents the silk industry as one of a committee of three from the above industries, appointed to study the present situation and work on the question of the further distribution of German dyestuffs.